UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF SOUTH CAROLINA
CHARLESTON DIVISION

IN RE: AQUEOUS FILM-FORMING FOAMS PRODUCTS LIABILITY LITIGATION	MDL No. 2:18-mn-2873-RMG This Document relates to: ALL CASES

PLAINTIFFS' OPPOSITION TO DEFENDANTS' MOTION FOR PARTIAL SUMMARY JUDGMENT ON THE FIRST ELEMENT OF THE GOVERNMENT CONTRACTOR IMMUNITY DEFENSE

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Plaintiffs, through Co-Lead Counsel for the Plaintiffs' Executive Committee ("PEC"), respectfully submit this Opposition to Defendants' Motion for Partial Summary Judgment on the First Element of the Government Contractor Immunity Defense and its accompanying memorandum (ECF Nos. 1965 & 1965-1) ["Motion" and/or "Defs' Mem."].

I. INTRODUCTION

After causing the contamination of the nation's drinking water and exposing hundreds of millions of Americans to toxic PFOS and PFOA ("PFAS"), Defendants seek to hide behind the Government Contractor Defense ("GCD"), contending that the United States government ("government") mandated that they use these specific surfactants to manufacture their proprietary Aqueous Film-Foaming Foam ("AFFF"). But nothing in the government's Military Specification ("MilSpec" or "MIL-F-24385") required Defendants to use these specific surfactants. The only guidance provided by the performance-oriented MilSpec was that the AFFF contain "fluorocarbon surfactants," part of a broader family of chemicals consisting of thousands beyond PFOA and PFOS. No further qualification or elaboration of the chemistry for those fluorosurfactants was ever mentioned. On its face, the first element of the GCD – that the MilSpec be "reasonably precise" – cannot be met.

Defendants' arguments otherwise gloss over the many genuine disputes of material fact and tell only a one-sided self-serving narrative. When put into a proper context with a *full* factual record, as is provided below, genuine disputes of material fact exist such that partial summary judgement should be denied.

Consider, for example, the following three critical facts omitted and/or misrepresented in Defs' Mem.:

(1) Defendants omit that Naval Research Laboratories ("NRL") *never* owned the compound patents for the fluorosurfactants used in AFFF, including PFOA and/or PFOS, nor the composition patents for the AFFF formulations themselves.[1] In fact, the NRL patent application Defendants reference, made initially in 1963, was **rejected** in its entirety by the United States Patent & Trademark Office, (affirmed on appeal), precisely because 3M *already* owned the patents- for PFOA (1951) and PFOS (1956). Thus, the NRL could only obtain a method patent in 1966 covering the mere *use* of the already 3M-patented compounds and AFFF formula.[2] This method patent was entirely different than both the *composition* of the fluorocarbon surfactant and the combination of the fluorocarbon surfactants used in AFFF.[3] Of further contextual importance is that the fluorosurfactant in 3M's AFFF used by DoD was for decades maintained by 3M as a trade secret. On this point, United States witness, Robert Darwin, the former Director of the Fire Protection Division of Naval Sea Systems Command ("NAVSEA"), who is considered the original custodian of MIL-F-24385, characterized these fluorosurfactants as the Defendants' proprietary "REDACTED" because the chemical formula was never even known to DoD.[4]

(2) Defendants contend that the military "constrained the types of fluorosurfactants" available to produce AFFF through the *performance* specifications of MIL-F-24385 (specifically the ability to extinguish a fire within a certain period of time while preventing burn back), which limited them to "only certain fluorocarbon surfactants"– namely PFOS or PFOA – out of the many thousands of such compounds known to exist. (Defs' Mem. at 14, 40). This contention is simply *false.* At a minimum, this contention presents a highly disputed question of fact, which is controverted by the annexed Declaration of Plaintiffs' expert, Gregory Walton. P.E. As a chemical and process engineer, Mr. Walton notes that at least one manufacturer developed AFFF concentrates that met MIL-F-24385's performance specifications *without* PFOA, PFOS and/or their precursors,[5] in 1982, using primarily C6 fluorosurfactants (95% C6, 4% C4, 1% C8), [6] with the unintended minute percentages

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[1] *See* Decl. of Pls.' Expert Patrick Lowder, Ph.D, J.D. ("Lowder Decl.") and attachments thereto, attached to the Decl. of Michael A. London ("London Decl.") as Ex. 1.

[2] *Id*. at ¶¶ 3-13.

[3] *Id*.

[4] *See* Dep. Tr. of Robert Darwin, dated Apr. 28, 2021 ("Darwin Dep. Tr. Vol. I"), attached to London Decl. as Ex. 2, at 46:23-47:2. Mr. Darwin further testified REDACTED *See id*. at 109:6-21 (REDACTED Given his role as the original custodian of the AFFF MilSpec, the fact that he had never even heard of PFOS and/or PFOA prior to 2000, renders any argument that the MilSpec required either of these two surfactants to be included in AFFF incredible.

[5] A precursor chemical is a chemical capable of transforming into another compound through chemical reactions.

[6] It is undisputed that C6 is a safer (*i.e*., less bioaccumulative) alternative to PFOS and PFOA that has been available for 40 years and is used today.

of C8 being so low as to not effect performance properties, or cause widespread PFOA contamination of drinking water. Further, the United States admits in this case: "AFFF MilSpec has never required that AFFF contain PFOA or PFOS." [7] Further still, Defendant National Foam's Senior Research Scientist, Anne Regina, famously dubbed the "Queen of Foam," because of her lengthy tenure working with AFFF, testified that REDACTED ."[8]

(3) Defendants contend that by January 2009, "there can be no dispute that the military had, by any measure, the necessary relevant information about MilSpec AFFF" (Defs' Mem. at 45), including the potential risk of harm to humans from PFOS and PFOA in such foam. But a dispute, in fact, exists – the government was *not* sufficiently informed of the potential hazards to human health from AFFF use, such that it could be said to have continued to use AFFF knowing of such hazards, until at least 2016 (at the earliest). Dr. Janet Anderson, a toxicologist who worked for the EPA and the Air Force, attested that any studies on AFFF from the 1960's through the 1990's were insufficient to warn the DoD of potential human health effects or long-term consequences from AFFF release to groundwater.[9] Further, Dr. Linda Birnbaum, a toxicologist formerly employed by the federal government for over forty years, and the former director of the National Institute of Environmental Health Sciences and the National Toxicology Program, after reviewing the record presented in Defs' Mem., opines that, "[t]he small set of studies conducted by the DoD and/or their agencies or outside contractors singled out and relied upon by Defendants in support of their claim that the DoD had full knowledge of the toxicity of AFFF are not of the type, quality, and scope to allow the EPA or DoD to conclude that the military's use of AFFF was hazardous to human health."[10] Such a determination could not have been made any earlier than ***2016,*** when the United States Environmental Protection Agency ("EPA"), the agency upon whom the DoD is *required* to rely for guidance regarding management decisions in the use of potentially toxic and harmful products and

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[7] The United States of America's Responses to Plaintiffs' First Set of Amended Requests for Admission ("US Resp. to Pls.' RFAs"), attached to London Decl. as Ex. 3, at p. 3, Resp. to RFA No. 5.

[8] Dep. Tr. of Anne Regina, dated Dec. 2, 2020 ("Regina Dep. Tr. Vol. II"), attached to London Declaration as Ex. 4, at 502:20-503:6 (emphasis added).

Q. REDACTED

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[9] Decl. of Janet K. Anderson, Ph.D., dated Nov. 29, 2021, and Exhibit A (Expert Opinion of Janet K. Anderson, Ph.D., D.A.B.T., dated Nov. 22, 2019) attached thereto, attached to London Decl. as Ex. 5, at p. 2 of Ex. A.

[10] Decl. of Pls.' Expert Linda S. Birnbaum, Ph.D., D.A.B.T., A.T.S. ("Birnbaum Decl") and attachments thereto, attached to London Decl. as Ex. 6, at ¶¶ 11c, 27.

> chemicals, issued its lifetime health advisory (LHA) wherein, for the first time, made a *final* determination and *quantification* of an amount of PFOA and/or PFOS present in drinking water that posed a potential risk to human health.[11] In fact, on the heels of the EPA's issuance of its LHA, the DoD began a program to discontinue use, and to replace any and all, remaining inventory of PFOA or PFOS-based foams.[12]

Only through omission and deliberate obfuscation can Defendants sustain their argument that there are no genuine disputes of material fact. In failing to tell the "rest of the story," as Paul Harvey, the famous news journalist, used to say, Defendants present a myopic, one-sided tale filled with misleading, and conclusory assertions.

Defendants' failure to provide a single supporting expert affidavit to assist this Court in the interpretation of highly complex subjects of chemistry, biology, bioaccumulation, environmental sciences, patent law, and toxicology, to name a few, in a case that so obviously requires expert analysis and opinion, is perhaps their ultimate *fatal flaw*. As the movant on a matter involving an affirmative defense, Defendants have the burden to conclusively establish the essential elements of their defense. Defendants ask this Court to step into the role of juror and fact finder to decipher the meaning of the scientific studies they provide (much of which is inadmissible evidence)[13] based on mere argument by counsel. The danger of relying on counsel to interpret expert data becomes obvious when reading the defense brief, which conflates two completely different areas of scientific inquiry --- *environmental* toxicology and *human* toxicology. Plaintiffs provide the expert declaration of Dr. Linda Birnbaum to explain that an environmental toxicology study does not

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[11] *Id*. at ¶ 19.

[12] PFOA or PFOS-based foams are sometimes referred to herein as "long-chain" MilSpec AFFF because the fluorosurfactants incorporated into such AFFFs contain 8-carbon chain length (or more) molecules as intended and active ingredients.

[13] Plaintiffs accompany this Response with their Rule 56(c) Objections to Evidence Submitted in Support of Defendants' Motion for Partial Summary Judgment on the First Element of the Government Contractor Immunity Defense to address the evidentiary deficits in Defendants' motion.

generate data relevant to human health concerns. She clarifies that this distinction is directly relevant to the question of what the government knew, and when, about the potential for harm to *humans* posed by the use of AFFF.

The controverted factual record presented here cannot shield the Defendants from liability under the GCD. When "the rest of the story" is told, the government's knowledge, especially as it varies over time, is demonstrably a question of fact for the jury that cannot be determined without weighing facts and credibility. Plaintiffs' Opposition provides the Court with the rest of the story, which confirms that neither: (1) MIL-F-24385 is "reasonably precise" on its face; nor (2) did the government continue to purchase and use MilSpec-AFFF containing PFOS, PFOA, and/or their precursors with adequate knowledge of the dangers associated with these noxious chemicals.

As such, the Motion for Partial Summary Judgment must be denied.

II. RELEVANT FACTUAL BACKROUND

This case involves one of the most egregious examples of corporate malfeasance in American history, which has resulted in PFAS contamination across the planet. Highly mobile in soil and water, and impervious to degradation, PFOA and PFOS have been found in virtually every corner of the earth, and in nearly every living thing: from house dust, to human blood, to wildlife everywhere, including in fish and animals as far away as the Arctic circle.[14] It has been found in human breast milk and the blood of practically every American.[15] In March of this year, PFAS were even found atop Mt. Everest.[16]

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[14] Dep. Tr. of 3M toxicologist John Butenhoff, Ph.D., dated July 24, 2020 ("Butenhoff Dep. Tr. Vol. II"), attached to London Decl. as Ex. 7, at 533:6-536:4, 538:18-542:17.

[15] *Id*.

[16] Carpenter, Murray, "*'Forever chemicals,' other pollutants found around the summit of Everest*," The Washington Post, April 17, 2021, available at https://www.washingtonpost.com/science/mt-everest-pollution/2021/04/16/7b341ff0-909f-11eb-bb49-5cb2a95f4cec_story.html (*last accessed* Nov. 19, 2021), attached to London Decl. as Ex. 8.

As early as the mid-1970s, 3M was aware that PFOS, a unique compound made almost exclusively by 3M (and incorporated into LightWater® AFFF for decades),[17] was found in the blood of the general population. Yet, as discussed in greater detail below, 3M kept that information secret, with its lawyers advising 3M scientists "not [to] reveal the true identity of PFOS" in the blood of the general population.[18,19] Like 3M, the AFFF-telomer Defendants,[20] *i.e.*, those Defendants involved in the manufacture of AFFF through the telomerization process, also consistently misrepresented the safety of their AFFF to DoD. The totality of this historical background sets the stage for the sweeping breadth of PFAS information that was *always* known by industry and *never* disclosed to the government.

A. 3M Developed the Original Fluorosurfactants Used in AFFF and Marketed AFFF Under the Brand Name LightWater®

3M began manufacturing PFAS in the 1940s and acquired the patent rights to the

[17] *See, e.g.*, Walker Dep. Ex. DL156, attached to London Decl. as Ex. 9, at 3M_BELL01511645-46; 3M_AFFF_MDL02318474, attached to London Decl. as Ex. 10, at 3M_AFFF_MDL02318474; 3M_BELL00848209, attached to London Decl. as Ex. 11, at 3M_BELL00848209; Butenhoff Dep. Ex. DL104, attached to London Decl. as Ex. 12, at DOD04-00015691; Gerber Dep. Ex. DL1423, attached to London Decl. as Ex. 13, at p. 4; 3M_AFFF_MDL00354270, attached to London Decl. as Ex. 14, at 3M_AFFF_MDL00354275; PENNA-NAVY-018123, attached to London Decl. as Ex. 15, at PENNA-NAVY-018125; Santoro Dep. Ex. DL187, attached to London Decl. as Ex. 16, at 3M_AFFF_MDL01092214; Mader Dep. Exs. 7 and 8, attached to London Decl. as Ex. 17 and 18, respectively; Olson Dep. Ex. LP2, attached to London Decl. as Ex. 19, at p. 4989; *see also* Butenhoff Dep. Tr. Vol. II, Ex. 7, at 542:6-17 (3M is the likely source of PFOS in global environmental media).

[18] Gerber Dep. Ex. LP68, attached to London Decl. as Ex. 20.

[19] Even 3M's top toxicologist acknowledged, when asked at his deposition herein, that in 1975 3M internally had reason to suspect PFOS was in the blood of the general population. *See* Dep. Tr. of John Butenhoff, dated July 23, 2020 ("Butenhoff Dep. Tr. Vol. I"), attached to London decl. as Ex. 21, at 300:2-10.

[20] This includes all Defendants except 3M. As discussed below, telomerization is an alternative manufacturing process to 3M's process for manufacturing fluorosurfactants.

electrochemical fluorination ("ECF") process in 1950.[21] Using this technology, 3M developed a new class of chemicals known as fluorocarbons, including fluorinated surfactants[22] or fluorosurfactants.[23] 3M subsequently received patents for specific fluorocarbon compounds, including PFOA and PFOS, throughout the 1950s and 1960s.[24]

Despite the "amazingly unique surface properties"[25] of these compounds, 3M struggled to find commercial applications for its fluorosurfactants. An article published in the March 1952 issue of POPULAR MECHANICS magazine, aptly titled --- "*WANTED --- Jobs for a Trillion New Chemicals*" --- explained that although "it's theoretically possible to produce around a trillion fluorocarbon compounds," and that 3M had identified "possible uses" for fluorocarbons, the company had not yet found commercial uses for them.[26] Lacking commercial applications for its fluorochemicals, 3M published a "series of trade advertisements that featured the surfactant technology and made specific reference to the unique properties obtainable with the

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[21] U.S. Patent No. 2,519,983 (issued Aug. 22, 1950), attached to the London Decl. as Ex. 22; *see also* Lowder Decl., Ex. A, for full details regarding the 3M and NRL patent history; Declaration of Plaintiffs' Expert Gregory M. Walton, P.E. and accompanying attachments ("Walton Decl."), attached to the London Decl. as Ex. 23, for further discussion regarding the ECF process.

[22] The word "surfactant" is a truncation of "surface active agent," a chemical that lowers the surface tension of a liquid, available at https://www.collinsdictionary.com/us/dictionary/english/surfactant (*last accessed* Nov. 29, 2021).

[23] Dep. Tr. of 3M senior technical manager Michael Falco, dated Nov. 18, 2020 ("Falco Dep. Tr."), attached to London Decl. as Ex. 24, at 161:21-163:13 (confirming how fluorocarbons came to be generated and invented by 3M in the 1950s as described in Falco Dep. Ex. DL390).

[24] 3M_AFFF_MDL02153586 (U.S. Patent 2,567,011 (issued Sept. 4, 1951)), attached to London Decl. as Ex. 25; Falco Dep. Exs. DL434 (U.S. Patent 2,732,398 (issued Jan. 24, 1956)), DL437 (U.S. Patent 2,759,019 (issued Aug. 14, 1956)), and DL438 (U.S. Patent 2,764,602 (issued Sept. 25, 1956)), attached to London Decl. as Exs. 26, 27, and 28, respectively; U.S. Patent 2,809,990 (issued Oct. 15, 1957), attached to London Decl. as Ex. 29; U.S. Patent 3,245,817 (issued Apr. 12, 1966), attached to London Decl. as Ex. 30; *see also,* Attachments C-D to Lowder Decl., Ex. 1.

[25] 3M_AFFF_MDL02153586, Ex. 25, at 3M_AFFF_MDL02153589.

[26] Falco Dep. Ex. DL390, attached to London Decl. as Ex. 31, at 3M_AFFF_MDL00579820, 579821, and 579827; *see also* Falco Dep. Tr., Ex. 24, at 157:9-171:12 (discussing Falco Dep. Ex. DL390).

fluorochemical molecule."[27] In 3M's own document, entitled, *The History of the Development of "Light Water" Brand Aqueous Film Forming Foam Concentrates*, this advertising campaign was described as follows:

> The ads appeared in chemical industry trade journals and were designed to attract the bench chemist. When a request for more information was received from one of these ads, the respondent was sent a questionnaire in which he was asked to define his problem. The returned questionnaire was then screened by a committee from the laboratory and Commercial Development Department, and certain surfactant samples were sent. These samples were intended to be tried in the customer's laboratory as the solution to his problem. **The samples were given 'L' numbers so that their chemical structure would not be identified**.[28]

The advertising campaign worked. In March 1962, E.J. Jablonski and Dr. Richard L. Tuve at the NRL responded to one of 3M's advertisements, inquiring about materials that might aid in the development of a new type of fire-fighting foam, referred to as AFFF.[29] Over the next few months, 3M sent several samples of its surfactant L-1083 (later redesignated FX172), labeled as such so as to keep the chemical composition secret to NRL, and visited NRL at least twice to discuss their fluorosurfactant properties and to review testing results.[30] 3M also began working

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[27] Falco Dep. Ex. DL124 (3M's History of the Development of Light Water AFFF), attached to London Decl. as Ex. 32, at 3M_AFFF MDL01297999.

[28] *Id.*(emphasis added); *see also* Darwin Dep. Exs. DL388 (1961 3M advertisement for fluorochemical "superfactant" with request for information coupon stating, "TELL ME MORE about 3M Surfactants!", at US-Darwin-00006296) and DL389 (similar 3M advertisement), attached to London Decl. as Exs. 33 and 34, respectively.

[29] Falco Dep. Ex. DL124, Ex. 32, at 3M_AFFF_MDL01298000; *see also* Darwin Dep. Tr. Vol. I, Ex. 2, at 141:19-23 ([redacted] Dep. Tr. of Director of Test Operations and lead AFFF qualifier at the NRL John Farley, dated June 24, 2021 ("Farley Dep. Tr. Vol. I"), attached to London Decl. as Ex. 35, at 107:17-108:12 ([redacted]

[30] Falco Dep. Ex. DL124, Ex. 32, at 3M_AFFF MDL01298000. Notably, NRL's investigation into AFFF containing 3M's fluorosurfactants, along with samples of the proprietary fluorosurfactants themselves, was also disclosed to Defendant National Foam in the early 1960s because "[i]t was assumed…that the manufacture of a commercial fire fighting foam would be done by companies already in the foam business." *Id*. at 3M_AFFF MDL01298001.

with Defendant Ansul Company to develop an effective AFFF dispensing system for the Navy.[31]

In 1963, 3M created its first successful AFFF formulation FX183, or "Light Water," and established pricing for sale to the Navy and Ansul.[32] The following year, 3M and Ansul entered an agreement for testing and finalizing 3M's AFFF formulations for sale to the military and commercial markets. The companies continued to reformulate Light Water for the military throughout the 1960s, including the development of a seawater compatible foam after a tragic deck fire occurred on the *USS Forrestal* Aircraft carrier.[33]

In fact, when NRL attempted to obtain patents for the fluorosurfactants used in AFFF in 1963, it was rejected by the US Patent Office because 3M *already* held patents for those fluorosurfactants, including the patents for PFOS and PFOA, as mentioned above.[34]

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.[35] In general, a MilSpec allows commercial manufacturers to sell products to the Navy (and other branches) as long as

[31] *Id*. at 3M_AFFF MDL01298000.

[32] 3M's final formulation of Light Water AFFF contained PFOS as the fluorosurfactant. *See* Butenhoff Dep. Ex. DL13, attached to London Decl. as Ex. 36, at 3M_AFFF_MDL00080689 ("FC-95 - C8F17SO'3K [PFOS potassium salt]" is the fluorochemical surfactant in Light Water AFFF).

[33] *See* Falco Dep. Ex. DL124, Ex. 32, at 3M_AFFF MDL01298001-03; *see also* Falco Dep. Tr, Ex. 24, at 189:19-227:12 (discussing Falco Dep. Ex. DL124); Falco Dep. Ex. DL387 (3M advertisement stating "The Navy believes" in 3M's Light Water), attached to London Decl. as Ex. 37.

[34] *See* Lowder Decl., Ex. 1, at ¶¶ 4-13 and Attachment B thereto; *see also* Farley Dep. Ex. DL1385 (Decl. of John P. Farley), attached to London Decl. as Ex. 38, at ¶ 7.

[35] Farley Dep. Ex. DL1385-4, attached to London Decl. as Ex. 39, at PENNY-NAVY-010913; *see also* Farley Dep. Ex. DL1385, Ex. 38, at ¶¶ 8-17; Darwin Dep. Tr. Vol. I, Ex. 2, at 74:6-12, 75:7-11, 77:21-78:16 REDACTED

those products satisfy the requirements set out in the MilSpec.[36] The AFFF MilSpec is a performance specification that indicates the required physical properties and fire extinguishing performance aspects of AFFF.[37] The NRL tests any eligible AFFF product on behalf of NAVSEA based on the testing requirements in the MilSpec, including laboratory tests (e.g., toxicity to marine life) and field tests (*e.g.*, burnback). Any product that meets the NRL's MilSpec testing requirements is then listed on the Qualified Product Listing ("QPL"), the first of which was 3M's Light Water in 1970.[38,39]

From 1969 to 2019, the AFFF MilSpec has required "fluorocarbon surfactants plus other compounds as required to conform to the requirements specified hereinafter," which "shall have no adverse effect on the health of personnel when used for its intended purpose."[40] Over the course of that fifty (50)-year span, the Navy never edited or narrowed the scope of the term "fluorocarbon surfactants."[41] The first time the MilSpec even referenced PFOS and PFOA was in 2017 and not as a requirement but as a limitation on its presence as an *impurity* not to exceed 0.00008%, *if any*.[42] Further, it was only in 2019 that NAVSEA removed the "fluoro" from the surfactant requirement,[43] but even that revision does not prevent the use of fluorosurfactants, rather

[36] Farley Dep. Ex. DL1385, Ex. 38, at ¶ 8.
[37] US Resp. to Pls.' RFAs, Ex. 3, at p. 3, Resp. to RFAs No. 1-4.
[38] Farley Dep. Ex. DL1385, Ex. 38, at ¶¶ 9-11.
[39] AFFF products from other Defendants made using the telomerization process (*see* Walton Decl., Ex. 23, at ¶¶ 14-28 for explanation), including most notably Ansul and National Foam, were listed on the QPL beginning in the mid-1970s. *See* Kleiner Dep. Ex. BB556, attached to London Decl. as Ex. 41, at p. 1.
[40] Darwin Dep. Ex. DL436 (MIL-F-24385, dated Nov. 21, 1969), attached to London Decl. as Ex. 42, at NAVY01-000000905; *see also* DOD01-000005595 (MIL-PRF-24385F(SH), dated Sept. 7, 2017, attached to London Decl. as Ex. 43, at DOD01-000005598.
[41] Farley Dep. Ex. DL1385, Ex. 38, at ¶¶ 16.
[42] DOD01-000005595, Ex. 43, at DOD01-000005599.
[43] NAVY01-000021563 (MIL-PRF-24385F(SH), dated May 7, 2019), attached to London Decl. as Ex. 44, at NAVY01-000021563 and -21565.

it only further broadens the manufacturers' discretion to meet the performance specifications of the MilSpec. Consistent with all prior versions, the current AFFF MilSpec *does not require* that a foam concentrate contain any specific fluorosurfactant, including PFOA or PFOS.[44]

B. 3M Has a Long History of Manufacturing Both PFOA and PFOS and Concealing the Totality of its Knowledge Regarding the Toxicity of these Chemicals from The Government.

As noted above, 3M manufactured an AFFF concentrate that was branded under the trade name LightWater®.[45] Although Defendants contend that NRL developed the name "Light Water" for AFFF,[46] the reality is 3M held the registered trademark for the term "Light Water".[47] Defendant 3M manufactured and utilized its own fluorosurfactant, *i.e.*, PFOS, sourced from its perfluorooctanesulfonyl fluoride ("POSF") chemistry, as the fluorosurfactant that powered its final AFFF concentrate.[48] Prior to 3M's exit from the perfluorooctanyl chemistry[49] market in May 2000,[50] it occupied by far the largest market share of AFFF sales to the United States government.[51]

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[44] *See* Walton Decl., Ex. 23, at ¶ 31 and Attachment F (MIL-PRF-24385F(SH), dated Apr. 7, 2020); US Resp. to Pls.' RFAs, Ex. 3, at p. 3, Resp. to RFA No. 5.
[45] *See, e.g.*, 3M_AFFF_MDL00015412 (Advertisement for LightWater® AFFF FC-200), attached to London Decl. as Ex. 45.
[46] Defs' Mem. at 10.
[47] Falco Dep. Ex. DL124, Ex. 32, at 3M_AFFF MDL01298002.
[48] Walton Decl., Ex. 23, at ¶ 15 (3M used an 8 carbon mercaptan as their starting material to produce their desired product, perfluorooctanesulfonyl fluoride ("POSF") upon which all their fluorochemical products and intermediates were based on - including PFOS).
[49] Perfluorooctanyl chemistry includes eight-carbon compounds where all of the hydrogen atoms are replaced by fluorine, and includes both PFOA and PFOS compounds. *See* Dep. Tr. of Tyco toxicologist John Prins, Ph.D., D.A.B.T., dated Jan. 21, 2021, relevant pages attached to London Decl. as Ex. 46, at 28:8-18, 37:1-20.
[50] Reich Dep. Ex. DL49 (3M phaseout announcement), attached to London Decl. as Ex. 47.
[51] 3M_AFFF_MDL01397437 (Hughes Associates, Inc. Estimated Quantities of Aqueous Film Forming Foam (AFFF) in the United States), attached to London Decl. as Ex. 48, at 3M_AFFF_MDL01397462 (noting that historically 3M was the primary supplier of MilSpec AFFF to DOD).

In the 50 years that 3M manufactured and sold PFAS-containing products, including its AFFF, it investigated them extensively, generating *hundreds* of studies and reports relating to their toxicology, pharmacology, epidemiology, teratology, carcinogenicity, fate, transport and human exposure.[52] These studies repeatedly identified and confirmed the human and environmental risks associated with its PFAS containing products—information that 3M chose not to adequately and timely disclose to appropriate government authorities, including EPA, despite having a regulatory obligation to do so under the Toxic Substances Control Act ("TSCA").[53] In the few instances when 3M did provide information to EPA, it did so in an incomplete and misleading manner.

3M's lack of transparency regarding human exposure to PFOS is the cause for the government's ignorance. 3M waited over 20 years, until 1998, to notify the EPA that PFOS had contaminated the globe and could be found in the blood of virtually every man, woman, and child.[54] In an attempt to conceal their delayed disclosure, 3M claimed this discovery to be "a complete surprise" that was only revealed by recent advancements in analytical techniques.[55] But, as set forth below, this explanation was untrue.

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[52] *See, e.g.*, Zobel Dep. Ex. BB226 (a 90-page index of studies performed by 3M during the 1970s, 80s and 90s, including pages of studies on PFOS and PFOA.), attached to London Decl. as Ex. 49.

[53] Section 8(e) of TSCA states: ''Any person who manufactures, [imports,] processes, or distributes in commerce a chemical substance or mixture and who obtains information which reasonably supports the conclusion that such substance or mixture presents a substantial risk of injury to health or the environment shall immediately inform the [EPA] Administrator of such information . . . ." 15 U.S.C. § 2607(e).

[54] 3M reported this information "as a precautionary measure" to the EPA on May 15, 1998. This disclosure to the EPA is widely credited as the initiating event that began EPA's investigation into PFAS compounds. Gerber Dep. Ex. DL353, attached to London Decl. as Ex. 50; *see also* 3M_AFFF_MDL01669634, attached to London Decl. as Ex. 51, at 3M_AFFF_MDL01669634 (EPA "has been assessing perfluorinated compounds since 1999…prompted by reports submitted to the agency describing the toxic properties and widespread presence in the environment, including in human populations, of some of these chemicals.").

[55] *See* Olsen Dep. Ex. LP193, attached to London Decl. as Ex. 52, at p. 3; *see also* Reich Dep. Ex. DL49, Ex. 47.

In reality, 3M learned in the summer of 1975 that two independent toxicologists, Drs. Warren Guy and Donald Taves, had discovered the presence of an unidentified organic fluorine compound in human blood from different blood banks. In multiple calls, Drs. Guy and Taves asked 3M if it knew of the "possible sources" of the chemicals they found in the blood of the general population, as Dr. Guy "somewhere […] got the information that 3M's fluorocarbon carboxylic acids are used as surfactants and wanted to know if they were present in 'Scotchgard' or other items in general use by the public."[56] Incredulously, 3M chose to "plead ignorance" and instead "adopted a position of scientific curiosity and desire to assist in any way possible ..."[57]

That same summer, 3M submitted 10 samples of 3M's PFAS compounds to its Central Research Analytical Laboratory "in an attempt to identify the material found by [Drs.] Guy and Taves in human blood."[58] On November 6, 1975, 3M scientist Richard Newmark of the Central Analytical Laboratory authored a report that concluded the fluorine compound discovered "resembled most closely" PFOS—a chemical manufactured only by 3M.[59,60] Despite pledging assistance to Drs. Guys and Taves in the characterization of this mystery chemical, 3M declined to share their information. An internal 3M timeline explained why: "3M lawyers urge [Central Analytical Laboratory] not to release the true identity (PFOS) of the [fluorine] compound."[61] Even

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[56] Gerber Dep. Ex. DL11, attached to London Decl. as Ex. 53, at 3M_AFFF_MDL00419718-19; *see also, generally*, Gerber Dep. Exs. LP207 and BB424, attached to London Decl. as Exs. 54 and 55, respectively.
[57] Gerber Dep. Ex. DL11, Ex. 53, at 3M_AFFF_MDL00419719.
[58] Gerber Dep. Ex. DL8, attached to London Decl. as Ex. 56, at 3M_BELL00054589.
[59] Gerber Dep. Ex. DL9, attached to London Decl. as Ex. 57.
[60] It is worth noting that subsequent to the work of Drs. Guy and Taves, 3M acquired its own pooled blood from the American Red Cross and replicated the work and results of Drs. Guy and Taves – specifically that PFOS was present in the blood of the general population. Dep. Tr. of 3M Fed. R. Civ. 30(b)(6) witness John Gerber, dated Aug. 19, 2021 ("Gerber Dep. Tr."), attached to London Decl. as Ex. 58, at 210:23-212:7.
[61] Gerber Dep. Ex. LP68, Ex. 20.

worse, in 1981, 3M published in the peer-reviewed literature that the mystery chemical observed by Drs. Guy and Taves was not a man-made chemical at all but was instead a naturally occurring substance, a patent misrepresentation.[62]

3M also conducted toxicology studies on rats, mice, and monkeys, which found that "[PFOS] was the most toxic of the three compounds studied and certainly more toxic than anticipated."[63,64] These studies reported "GI tract toxicity, lipid depletion of adrenals, atrophy of pancreatic exocrine cells and serous alveolar cells of the salivary glands."[65] Indeed, 20 of the 24 rhesus monkeys who participated in this study died as a result of their exposure to PFOS.[66,67] Despite this body of knowledge, 3M decided to not disclose this important public health information to the EPA.[68]

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[62] Olsen Dep. Ex. DL884, attached to London Decl. as Ex. 59.

[63] Internal documents produced by 3M indicate that Drs. Guy and Taves' finding of PFOS in the blood of the general population was the initiating "event" that led to 3M's toxicology studies of PFOS as well as PFOA. *See* Butenhoff Dep. Ex. DL13, Ex. 36, at 3M_AFFF_MDL 00080700.

[64] Gerber Dep. Ex. DL1353, attached to London Decl. as Ex. 126, at 3M_AFFF_MDL 02174949.

[65] Butenhoff Dep. Ex. DL13, Ex. 36 at 3M_AFFF_MDL00080705.

[66] *Id*.

[67] Simultaneously to 3M's study of the toxicity of PFAS compounds was an investigation into their environmental attributes. By 1979, 3M had concluded that both PFOA and PFOS had "the potential for widespread distribution in the environment;" because they would "persist in the environment;" they were "highly mobile" in soils; and that therefore "waterways" would be their ultimate "environmental sink." *See* Mader Dep. Exs. 16, 18, 19, and 20, attached to London Decl. as Exs. 60, 61, 62, and 63, respectively.

[68] *See* Gerber Dep. Tr., Ex. 58, at 90:23-91:25.

> Q: True or false: By 1980, 3M was in possession of information that PFOS was a bioaccumluative compound, that it was widespread in the blood of the general population, and that it killed rhesus monkeys that were exposed to it. […]
>
> A: Based on my review of the documents, 3M had all of – had those pieces of information […] but […] all of that information needs to be put together and judgment applied to making a TSCA 8(e) reporting decision.
>
> Q: Right. And 3M did that. 3M had all of that information and decided not to disclose it at that time in 1980, right?

In or around 1998, John Buttenhoff, 3M's chief toxicologist, calculated an internal "safe reference level" of PFOS in human blood.[69] Although his calculated safe level was *thirty times higher* than the median level of PFOS found in the blood of the general population, there is no evidence that 3M disclosed this important internal determination to EPA, DoD, or any other regulatory or government agency. At approximately the same time, 3M internally referred to PFOS as "insidiously toxic" and acknowledged that it should be "replaced."[70] Still, 3M continued to produce PFOS for four more years.[71]

C. AFFF-Telomer Manufacturers

Because 3M held the patent rights to the ECF process, no other company could fluorinate chemicals using the ECF method. Therefore, competing companies developed an alternative chemical process known as fluorotelomerization. Instead of using electricity in a reactor like 3M's ECF process, fluorotelomerization is essentially a chemical reaction to manufacture perfluoroalkyl substances.[72] This process produces a mixture of fluorosurfactants with fluorinated carbon chains containing an even number of carbon atoms (*e.g.*, C2, C4, C6, C8, C10, etc.).[73]

Companies such as Defendants DuPont and Clariant would use fluorotelomerization to manufacture fluorochemicals, sometimes referred to as "telomer iodides" or "intermediates," and

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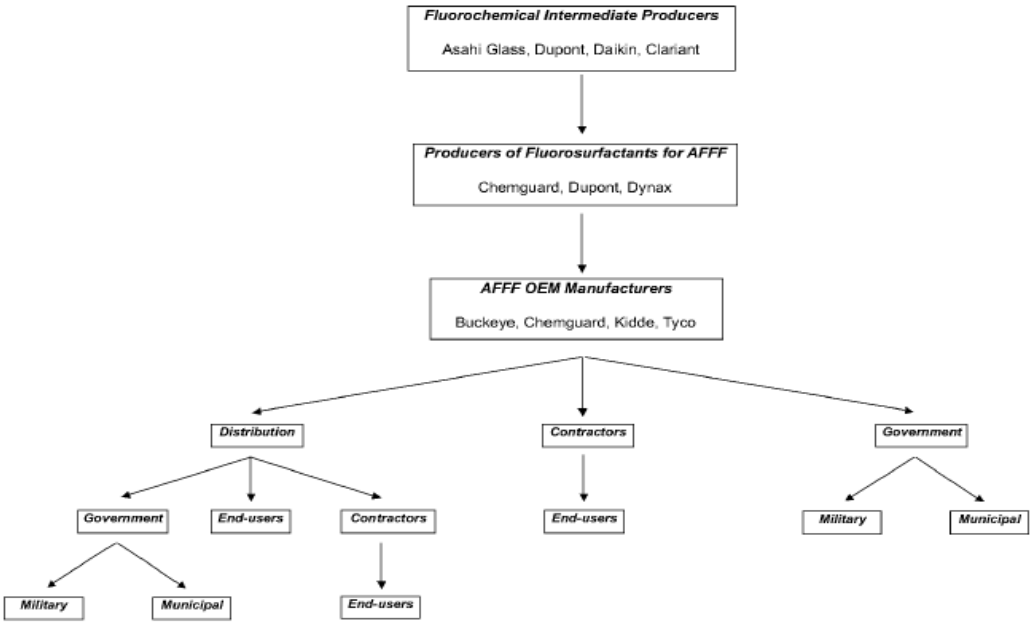
> A: Yes. I've reviewed documents that – you know, after the – those studies were conducted, that information was reviewed against EPA's reporting criteria, and the company made the determination that the information was not substantial risk information under TSCA 8(e).

[69] Butenhoff Dep Tr. Vol. II, Ex. 7, at 444:9-447:9.
[70] Butenhoff Dep Tr. Vol. I, Ex. 21, at 214:24-217:5.
[71] *Id*.
[72] Buck, R.C., et al. *Perfluoroalkyl and Polyfluoroalkyl Substances in the Environment: Terminology, Classification, and Origins*. Integr. Environ. Assess. Manag. 2011; 7:513-541, attached to London Decl. as Ex. 64. Dr. Buck is employed by Defendant the Chemours Company.
[73] Walton Decl., Ex. 23, at ¶ 19.

sell them to the producers of fluorosurfactants. The fluorotelomerization process has been used to create C8 and C6 intermediates since at least the 1970s. As the below depicted AFFF market channel diagram points out, the fluorosurfactant producers (*i.e.*, Defendants Ciba-Geigy (now BASF Corp.), Chemguard, Dynax, DuPont, and Atofina (now Arkema, Inc.)) would then sell their fluorosurfactants to the "telomer-based" AFFF manufacturers (*i.e.*, Defendants Buckeye, National Foam, Kidde, Ansul, and Chemguard).[74]



Unlike 3M's LightWater® AFFF, which utilized PFOS as the fluorosurfactant, the telomer-based foam manufacturers generally elected to use fluorosurfactants that were C8, C6, or a mixture of both carbon-chain lengths. Importantly, the C8-based fluorosurfactants included PFOA and PFOA precursors that breakdown into PFOA once released into the environment.[75] When 3M phased out their C8 chemistry products in 2000, including LightWater®,[76] rather than following 3M's lead, the telomer-based AFFF manufacturers were quick to fill the market void

[74] 3M_BELL02641301, attached to London Decl. as Ex. 65.
[75] Korzeniowski Dep. Ex. DL91, attached to London Decl. as Ex. 66, at p.2.
[76] Reich Dep. Ex. DL49, Ex. 47.

(and the fluorosurfactant producers were keen to oblige the market demands), and touted their products as being "PFOS-Free" and safer than 3M's LightWater.® However, the telomer-based AFFF manufacturers failed to advise the DoD and its other customers that they continued to use C8-based fluorosurfactants, which included PFOA and PFOA precursors.[77]

Following the 3M phaseout, the EPA began to research C8 chemistries due to their persistence, bioaccumulative, and toxic properties ("PBT"). In 2006, the EPA urged the eight (8) largest global manufacturers of PFOA and PFOA precursors to voluntarily phase out their C8 products from 2006 through December 31, 2015.[78] The "2010/2015 PFOA Stewardship Program" was a voluntary program whereby the manufacturers of PFOA and PFOA precursors would achieve a 95% reduction in emissions and in products by 2010, and a 100% elimination by the end of 2015.[79]

If 3M's exit from the PFAS market in 2000, at the cost of $200 million per year,[80] was not enough, the 2010/2015 PFOA Stewardship Program surely should have put the telomer-based AFFF manufacturers and the fluorosurfactant producers on notice to discontinue their C8-based products, including AFFF. Instead, during this entire period from 2000-2015, the telomer based foam makers continued to reassure DoD, and the public at large, that their telomer- based AFFF

[77] *See infra* Section IV.B.3.
[78] *See generally* EPA, Fact Sheet: 2010/2015 PFOA Stewardship Program, available at: https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/fact-sheet-20102015-pfoa-stewardship-program (*last accessed* on December 6, 2021).
[79] Specifically, the signatory companies included: Arkema, Asahi, BASF Corp. (successor to Ciba-Geigy), Clariant, Daikin, 3M/Dyneon, DuPont, and Solvay Solexis. *See* Buck Dep. Ex. DL371, attached to London Decl. as Ex. 67, at p. 3.
[80] *See* Reich Dep. Ex. DL49, Ex. 47.

was safe and PFOA-free,[81] a representation upon which the DoD reasonably relied.[82]

III. LEGAL STANDARDS

A. Partial Summary Judgment Standard

Summary judgment is only appropriate if the movant shows that there is *no* genuine dispute as to *any* material fact and the movant is entitled to judgment as a matter of law as to matters upon which it has the burden of proof at trial. *See Celotex Corp. v. Catrett*, 477 U.S. 317, 325 (1986); FED. R. CIV. P. 56(a). "Ordinarily, because of the standard applied at the summary judgment stage, defendants are not entitled to summary judgment pursuant to the government contractor defense." *Coach v. Armstrong Int'l Inc.*, No. CIV.A. 2:12-60180-ER, 2014 WL 7404841, at *1 n.1 (E.D. Pa. Sept. 25, 2014) (denying summary judgment as to *Boyle* prong 1 because plaintiff had submitted affidavits controverting defendants' evidence as to whether the Navy issued reasonably precise specifications).

Defendants' motion is also flawed because it fails to include an affidavit setting forth expert opinions in support of their arguments. Although Rule 56 does not specifically require an expert affidavit in support of every motion for summary judgment, in complex matters involving scientific evidence, an expert affidavit is typically required because issues such as standard of care, breach and causation, for example, lay beyond the ordinary realm of lay understanding. *See, e.g., Looney v. Zimmer, Inc.*, No. 03-0647-CV, 2004 WL 1918720, at *5 (W.D. Mo. Aug. 19, 2004),

[81] *See generally* Korzeniowski Dep. Ex. DL93, attached to London Decl. as Ex. 68; *see also* Regina Dep. Ex. DL517, at AFFF-MDL-CHE00000911 (2001 FFFC presentation to the EPA stating that telomer-based AFFF does not contain any PFOA-based products), attached to London Decl. as Ex. 69.

[82] Dep. Tr. of Frederick Walker, who worked for the Air Force for 40 years and is the Chief Fire Protection Engineer for the Air Force, dated May 19, 2021 ("Walker Dep. Tr. Vol. I"), attached to London Decl. as Ex. 70, at 173:19-175:24 (t[redacted]

(citing *Turner v. Iowa Fire Equip. Co.*, 229 F.3d 1202, 1210 (8th Cir. 2000); *see also In re Lipitor Mktg., Sales Practice & Prods. Liab. Litig.*, 226 F. Supp. 3d 557, 569-77 (D.S.C. 2017) (Gergel, J.) (recognizing that most jurisdictions (including Florida, Massachusetts, and South Dakota – the three bellwether jurisdictions in this MDL) "require expert testimony at least where the issues are . . . complex and outside common and lay experience.").

B. Government Contractor Defense

In *Boyle v. United Techs. Corp.*, 487 U.S. 500, (1988), the Supreme Court recognized that "state law which holds Government contractors liable for design defects in military equipment does in some circumstances present a 'significant conflict' with federal policy and must be displaced." *Id*. at 512.

Boyle's formulation of the government contractor defense has roots in the "discretionary function" defense under the Federal Tort Claims Act, which exempts liability for government employees' performance of discretionary functions or duties, even when there is an abuse of discretion. *Id*. at 511 (citing 28 U.S.C. § 2680(a)). Thus, the exercise of discretion (*i.e*., the government's approval of "reasonably precise specifications") is key to the defense. The "reasonably precise" condition "assure[s] that the suit is within the area where the *policy* of the 'discretionary function' would be frustrated." *Id.* at 512. (emphasis added). The *policy* of the discretionary function is to prevent courts from "second guessing" discretionary governmental decisions. *Id.* (citation omitted).

"The requirement that the specifications be precise means that the discretion over *significant details and all critical design choices* will be exercised by the government." *Trevino v. General Dynamics Corp.*, 865 F.2d 1474, 1481 (5th Cir. 1989) (emphasis added). *Boyle's* first prong aims to ensure "that the design feature in question was considered by a Government officer,

and not merely by the contractor itself." *Boyle*, 487 U.S. at 512. "The essence of the defense is to prevent the contractor from being held liable when the government is actually at fault . . . ." *Campbell v. Brook Trout Coal, LLC*, No. CIV.A. 2:07-0651, 2008 WL 4415078, at *9 (S.D.W. Va. Sept. 25, 2008) (quoting *Trevino*, 865 F.2d at 1478). "Stripped to its essentials, the military contractor defense under *Boyle* is to claim, 'The Government made me do it.'" *In re Joint E. & S. Dist. N.Y. Asbestos Litig.*, 897 F.2d 626, 632 (2d Cir. 1990).

"[S]tate-law claims against military contractors are preempted under *Boyle* only where the federal Government has *mandated* the action that allegedly violated state law." *Badilla v. Midwest Air Traffic Control Serv.*, 8 F.4th 105, 122 (2d Cir. 2021) (emphasis added). "The level of governmental control required is significant; merely providing general direction while leaving the implementation to others will not suffice." *Pettiford v. City of Greensboro*, 556 F. Supp. 2d 512, 540 (M.D.N.C. 2008) (citing *Boyle*, 487 U.S. at 509). Where the specifications provide only imprecise or general guidelines, "the contractor retains the discretion over the important design decision and enjoys no immunity against liability based on the *Boyle* defense." *Gray v. Lockheed Aeronautical Sys. Co.*, 125 F.3d 1371, 1377 (11th Cir. 1997). Indeed, as the Second Circuit recognized, "[h]ad *Boyle's* aim been to prevent military contractors from passing *any* liability costs on to the Government it simply could have granted military contractors a blanket immunity from all state tort liability." *Asbestos Litig.*, 897 F.2d at 631 (emphasis added).

Federal courts have consistently confirmed that the affirmative defense presents a question of fact for the jury. Regarding *Boyle* prong 1, the Fourth Circuit observes: "whether the facts establish the conditions for the [government contractor] defense is a question for the jury." *Suhail Najim Abdullah Al Shimari v. CACI Int'l Inc.*, 679 F. 3d 205, 217 n.10 (4th Cir. 2012) (quoting *Rodriquez v. Lockheed Martin Corp.*, 627 F.3d 1259, 1266 (9th Cir. 2010) (citing *Boyle*)); *see also*

Trevino, 865 F.2d at 1480 ("the *trier of fact* will determine whether the government has exercised or delegated to the contractor discretion over the product design.") (emphasis added); *see also O'Connor v. Boeing N. Am., Inc.*, No. CV 00-0186, 2005 WL 6035255, at *22 (C.D. Cal. Aug. 18, 2005) (denying summary judgment because "a reasonable jury could find that the United States government provided Defendants with discretion of whether to use TCE" or another chemical.).

In *O'Connor*, plaintiffs sued a government contractor for damages they claimed were caused from drinking water and breathing air that were contaminated with trichloroethylene ("TCE") that defendants used in vapor degreasing and rocket engine flushing pursuant to a federal contract. *Id.* at *20-21. The defendants asserted that the government "set forth the particular type of TCE to be used" and that they were "obligated to incorporate the specifications into its own process specifications . . . ." *Id.* at *76. In response, the plaintiffs maintained that "no language from any government contract actually requires the use of TCE." *Id.* at *76-77. The court agreed with the plaintiffs finding that "a reasonable jury could find that the United States government provided Defendants with discretion on whether to use TCE" and rejected defendants' motion for summary judgment on the issue. *Id.* at *77.

In support of their Motion, Defendants cite to cases where courts have granted summary judgment for contractors who Defendants argue retained discretion over designs.[83,84] However, the facts in these cases are dissimilar from Plaintiffs' case because in each case, the evidence demonstrated *significant* government involvement in the *specific* feature that proved defective.

[83] Defendants do not claim that the government prohibited them from providing product warnings or instructions to end users. Thus, their Motion does not address plaintiffs' failure-to-warn claims. *Tate v. Boeing Helicopters*, 55 F.3d 1150, 1156 (6th Cir. 1995) ("In the government contractor defense context, design defect and failure to warn claims differ practically as well as theoretically. Simply because the government exercises discretion in approving a design does not mean that the government considered the appropriate warnings, if any, that should accompany the product.").
[84] *See* Defs' Mem. at 6.

For example, in *Tozer v. LTV Corp.*, the court found the first *Boyle* element satisfied because the evidence established that the Navy had specifically asked the contractor to replace its original design with a different design that the Navy ultimately approved. 792 F.2d 403, 407-480 (4th Cir. 1986). Likewise, in *Oliver v. Oshkosh Truck Corp*., 911 F. Supp. 1161, 1165 (E.D. Wis. 1996), the government engaged in ongoing dialogue with the defendant regarding the configuration and placement of the vehicle's defective fuel tanks.[85]

Defendants argue that they could not comply with the MilSpec requirements without including PFOS or PFOA in AFFF which is a vital federal interest.[86] Plaintiffs' evidence and statements from DoD clearly show, however, that AFFF *can* be manufactured and *is* being manufactured without PFOS or PFOA. Therefore, the concern expressed in *Boyle* that the government could not perform its federal interest – in this case, obtaining products from contractors to effectively extinguish fuel-based fires – does not exist or, at a minimum, is an issue

[85] Defendants' other cases are equally distinguishable.*See Carley v. Wheeled Coach*, 991 F.2d 1117, 1125 (3d. Cir. 1993) (government approved reasonably precise specifications regarding an ambulance's center of gravity, the design feature at issue in the case); *Glassco v. Miller Equip. Co., Inc*., 966 F.2d 641, 643 (11th Cir. 1992) (government's reasonably precise specifications exceeded eleven pages in length and required the use of leather, not an alternative product); *Gauthreaux v. United States*, 694 F. Supp. 2d 460, 466 (E.D. Va. 2009) (government's "vast number of other detailed requirements" but not side mirrors on forklift, were reasonably precise to satisfy *Boyle* prong 1); *Szigedi v. Ensign-Bickford Co,* No. 1:00 CV 00836, 2002 WL 32086774, at *6 (M.D.N.C. July 15, 2002) *report & recommendation adopted sub nom. Szigedi v. Ensign Bickford Aerospace Co.*, No. 1:00 CV00836, 2003 WL 21003510 (M.D.N.C. Apr. 10, 2003) (design of a grenade entailed significant collaboration between defendant, the FBI's Hostage Rescue Team and Army, Marine and Navy Seals Special Operations force); *Yeroshefsky v. Unisys Corp*., 962 F. Supp. 710, 712–13 (D. Md. 1997) (Postal Service participated in and created the product's design, had provided precise specifications including descriptions of the keyboard configuration, key pressure adjustment control, letter sorting rate, speed control, and operator's console, all of which were related to the repetitive stress injury at issue); *Guerinot v. Rockwell Intern. Corp*., 923 F.2d 862 (9th Cir. 1991) (Navy approved all aspects of design of ejection seat sensor including the use of Loctite locking agent that caused sensor failure); *Kase v. Metalclad Insulation Corp*., 212 Cal. Rptr. 3d 198 (Cal. App. 2016) (Navy made a deliberate design choice that could *only* be met with the alleged defective product at issue).

[86] *See* Defs' Mem. at 17-19.

for the jury to determine. Likewise, Defendants have also failed to demonstrate that that there is no genuine dispute as to any material fact relating to whether Defendants' "obligations to the government conflict with state law such that [they] may not comply with both." *Ripley v. Foster Wheeler LLC*, 841 F.3d 207, 210 (4th Cir. 2016) (citing *Boyle*, 487 U.S. at 507-09). Plaintiffs have provided an abundance of evidence showing that Defendants could have fulfilled their duty to the government by providing MilSpec AFFF that did not contain PFOA or PFOS.[87]

IV. ARGUMENT

There are two pathways by which Defendants could have satisfied their burden with respect to *Boyle* prong 1. *See Dowd v. Textron, Inc.*, 792 F.2d 409, 411-413 (4th Cir. 1986). Despite the existence of two potential pathways, Defendants failed to satisfy either, and, therefore, partial summary judgment should be denied. More particularly, and, as set forth below, Defendants have failed to prove as a matter of law that either: (1) MIL-F-24385 is reasonably precise on its face and/or (2) that DoD continued to purchase and use MilSpec AFFF containing-PFOA, PFOS and/or their precursors despite actual knowledge of the dangers to humans associated with these noxious chemicals.[88]

A. Defendants Failed to Demonstrate as a Matter of Law that MIL-F-24385 is "Reasonably Precise" On its Face

[87] *See* Walton Decl., Ex. 23, at ¶¶ 31-36.

[88] In the Fourth Circuit, the government must actually know of the defect to satisfy the GCD. *See Ramey v. Martin-Baker Aircraft Co. Ltd.*, 874 F.2d 946, 951 n.10 (4th Cir. 1989) (matters known by contractor must differ from the government about information "not already known to it."); *Tozer v. LTV Corp.*, 792 F.2d 403, 408 (4th Cir. 1986) (contractor's knowledge must be "unknown to the Navy") ; *Dowd v. Textron, Inc.*, 792 F.2d 409, 412 (4th Cir. 1986) (Army did not request changes "despite **knowing something** of the existence and/or efficacy of these devices") (emphasis added) ; *Yersoshefsky v. Unisys Corp.*, 962 F. Supp. 710, 721 (D. Md. 1997) ("Nothing in the record of this case suggests that Burroughs **actually knew** of any danger with the [device] that the USPS did not.") (emphasis added).

Defendants first argue that they have satisfied *Boyle* prong 1 because, according to Defendants, MIL-F-24385 is "reasonably precise" on its face. This argument should fail because genuine disputes over material questions of fact exist as to whether MIL-F-24385 is reasonably precise. In particular, a series of facts defeat every argument that MIL-F-24385 is reasonably precise as a matter of law: (1) the Navy drafted MIL-F-24385 as a performance specification to provide manufacturers with the greatest flexibility as to how they would meet its requirements; (2) AFFF manufacturers have full discretion as to which of the thousands of fluorosurfactants available for use in AFFF to use in their products; (3) MIL-F-24385 does not mandate the use of C8 compounds, specifically, PFOA, PFOS and/or their precursors; (4) MIL-F-24385 has never explicitly required that AFFF contain PFOA, PFOS and/or their precursors; and (5) the Navy, and DoD in general, lacked actual knowledge of the exact composition of the various fluorosurfactants formulations of MilSpec AFFF because these formulations were maintained as proprietary trade secrets.

1. MIL-F-24385 is a Performance Specification.

It is undisputed that MIL-F-24385 is a performance specification, not a design specification. Importantly, the United States admitted it was a performance specification in response to Plaintiffs' First Set of Amended Requests for Admissions.[89] Although the Defendants call this distinction a red herring, they too admit that MIL-F-24385 is in fact a performance specification.

The government's custodian of the AFFF MilSpec acknowledged it was a performance spec:

Q. REDACTED

[89] US Resp. to Pls.' RFAs, Ex. 3, at p. 3, Resp. to RFA No. 3.

[redacted][90]

[redacted][91] This evidence is not controvertible and conclusively establishes that MIL-F-24385 is a performance specification that does not precisely dictate or constrain the design of the product, particularly its fluorosurfactant components.

2. AFFF Manufacturers Had Full Discretion as to Which Fluorosurfactant(s) to Use in their AFFF.

The MilSpec is not so reasonably precise to have "cabined significantly" the Defendants' choice of using only fluorosurfactants with eight carbons such as PFOA or PFOS.[92] The term "fluorosurfactant" describes a family of chemicals encompassing more than 4,000 unique known

[90] Darwin Dep. Tr. Vol. I, Ex. 2, at 41:6-42:10 (emphasis added).
[91] Farley Dep. Tr. Vol. I, Ex. 35, at 53:6-54:2 ([redacted] *see also*, Walker Dep. Tr. Vol I, Ex. 70, at 74:4-75:21 [redacted] Farley Dep. Ex. DL1385, Ex. 38, at ¶ 11 ("The AFFF MilSpec is a performance specification…[and] provided a set of product criteria…without specifying specific formulations…").
[92] Defs' Mem. at 42.

compounds.[93] Even the Defendants admit that thousands of these fluorosurfactants are commercially available for use in AFFF agents.[94]

Fluorosurfactants are chemicals that have a chain of carbon atoms with one or more fluorine atoms bonded to some or all the carbon atoms. [95] One end of the carbon chain has various chemical groups attached that influence the physical properties of the surfactant.[96] The carbon chain may be linear or contain branches.[97] Each carbon atom forms 4 bonds with other atoms with carbon-carbon, carbon-fluorine, and carbon-hydrogen bonds being the most common.[98] The purpose of the fluorosurfactants are to decrease the surface tension of the concentrate/water solution.[99] This makes it easier to generate foam from the solution.[100] The surfactants also decrease the interfacial tension between the foam and the combustible liquid.[101] The lower the interfacial tension, the faster the foam spreads over the combustible liquid.[102]

If the Navy had known the precise molecular structure of the fluorosurfactant(s) used in

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[93] Buck, R.C., et al. *Identification and classification of commercially relevant per- and poly-fluoroalkyl substances (PFAS)*. Integr. Environ. Assess. Manag. 2021; 17:1045–1055, attached to London Decl. as Ex. 71. Dr. Buck is employed by Defendant the Chemours Company.

[94] 3M_AFFF_MDL01863928, attached to London Decl. as Ex. 72, at 3M_AFFF_MDL01863932 (as of 1952, thousands of fluorocarbons were known); Falco Dep. Ex. DL390, Ex. 31, at 3M_AFFF_MDL00579821 (Popular Mechanics article noting that as of 1952, it was "theoretically possible to produce around a trillion fluorocarbon compounds that were being produced in "one corner of a new building erected by" 3M); Dep. Tr. of Tyco regulatory witness Gregg Ublacker, dated Mar. 4, 2021, attached to London Decl. as Ex. 73, at 434:8-12 (REDACTED Farley Dep. Ex. DL1385, Ex. 38, at ¶ 23 (stating there are more than 5,000 PFAS analytes).

[95] *See* Walton Decl., Ex. 23, at ¶¶ 8-12.

[96] *Id*.

[97] *Id*.

[98] *Id*.

[99] *Id*.

[100] *Id*.

[101] *Id*.

[102] *Id*.

AFFF, which it did not, and wanted to specify which to use, it could have done so.[103] Instead, the Navy elected to keep the broad term fluorocarbon surfactant in the MilSpec from 1969 to 2019. Through all ten (10) revisions, it never changed that term.[104] The government admitted that it elected to use that MilSpec to "give the manufacturers the greatest flexibility as to how they would meet the AFFF MilSpec's requirements and to promote competition both on performance and price."[105] The government has acknowledged that it left the selection of a fluorosurfactant to the discretion of the manufacturer; at his deposition, Mr. Darwin, the MilSpec custodian, recognized:

REDACTED

[106] John Farley, the Director of Fire Test Operations at NRL, and lead qualifier for AFFF products at NRL, similarly declared:

REDACTED

[107]

Given that the manufacturers were able to choose any of the thousands of fluorosurfactants available for use in their AFFF, it cannot be held as a matter of law that they were directed by the government to use only two (2) of them- PFOA or PFOS.

3. The Manufacturers Were Never Required to Use PFOA and/or PFOS to

[103] *Cf. In re Agent Orange Prod. Liab. Litig.*, 517 F.3d 76, 89-91 (2d Cir. 2008) (Army specified that the "formulation" for Agent Orange would be a 50/50 mix of two chemicals --- 2,4-D and 2,4,5-T, and at precise purity levels).
[104] Farley Dep. Ex. DL1385-4, Ex. 39, at PENNA-NAVY-010912-17.
[105] US Resp. to Pls.' RFAs, Ex. 3, at p. 3, Resp. to RFA No. 4.
[106] Darwin Dep. Tr. Vol I., Ex. 2, at 46:17-47:2 (emphasis added); *see also* Sheinson Dep. Ex. DCC627 (Decl. of Ronald Sheinson, NRL Research Chemist from 1970 to 2010, dated June 10, 2021), attached to London Decl. as Ex. 74, at ¶ 3 (NRL "does not conduct tests to determine the chemical constituents of AFFF, as each AFFF manufacturers' precise chemical formulation is proprietary information.").
[107] Farley Dep. Ex. DL1385, Ex. 38, at ¶16 (emphasis added).

Meet MilSpec

Defendants argue that the AFFF MilSpec "sufficiently constrained" their choice of fluorosurfactant because only "certain" surfactants, *e.g.,* PFOS and PFOA, could pass its performance specifications.[108] Defendants then elaborately detail these performance criteria as if that would render the indeterminate language of the MilSpec – "The concentrate shall consist of fluorocarbon surfactants plus other compounds as required to conform to the requirements specified hereinafter"[109] – more precise. But the text of the MilSpec is hardly precise and Defendants' evidence fails to prove they were constrained in any way to use a particular fluorosurfactant. Moreover, the contradictory evidence they omit -- that Defendants, in fact, had the ability to manufacture AFFF that complied with the MilSpec but did not contain PFOA and/or PFOS as an active ingredient that impacted the foam's performance -- defies their contentions. In particular, Defendants fail to mention that a non-C8 derived AFFF product, which consists of over 95% C6-based fluorosurfactants (i.e., 95% C6, 4% C4 and 1% C8),[110] was on the DoD's QPL in 1982, and proves that, at all relevant times, MIL-F-24385 did not require the use of PFOA, PFOS, or any other C8-based precursor product as an ingredient necessary for performance.[111]

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[108] Defs' Mem. 42.

[109] Darwin Dep. Ex. DL436, Ex. 42, at NAV01-000000905.

[110] Kleiner Dep. Ex. BB556, Ex. 41, at p. 2 (identifying Ansul's Ansulite 6% AFFF/AFC-5 as being on the QPL as of 1982); *see also* Dep. Tr. of BASF witness Todd Thomas, Ph.D., dated Sept. 16, 2020, attached to London Decl. as Ex. 75, at 106:10- 107:22 (the two fluorosurfactants incorporated into AFC-5, namely, Lodyne S-103 and Lodyne 81-84, are based on Lodyne 920A mercaptan that is fractionated into multiple cuts, including 921A, which is a mercaptan used to make Lodyne surfactants 81-84 and S-103, which are 95-plus percent C6-derived fluorosurfactants). Of note, this C6-derived AFFF formulation did contain trace levels (1%) of C8 precursors. *See* Thomas Dep. Ex. LP245, attached to London Decl. as Ex. 76.

[111] Ironically, Defendants' claim that even PFOA and/or PFOS resulting as an *unintended* byproduct of the manufacturing process of AFFF underscore *ipso facto* they could not have been government mandated. It is simply not true because the levels of C8 are so low they do not affect the physical properties or performance of the concentrate or foam. *See* Walton Decl., Ex. 23, at ¶36.

The technology to make high purity C6 fluorosurfactants (95%-99%), and the way in which it was accomplished, has been around since at least the 1960's and was not a cost-prohibitive process.[112] The process, known as distillation, separates mixtures of chemicals based on the different boiling points of the chemicals within the mixture and is ancient technology dating back to 3000 BC.[113] The distillation equipment comparable to that used by the fluorosurfactant manufacturers became commercially available in the 1930s.[114] The batch distillation configuration used by 3M, Dupont, Ciba-Geigy (now BASF) and others consists of readily available components: a heated pot, a rectifying column, a condenser, and a valve to divert a portion of the condensed vapor (called condensate) to one or more receivers.[115] The distillation process allows fluorochemical manufacturers and users to separate the compounds into cuts of the desired fluorosurfactant to 95% or more.[116]

The concentration of the desired fluorosurfactants in one or more of the cuts may be high enough to proceed to the next manufacturing step.[117] If not, the cut may be redistilled to further increase the concentration of the desired fluorosurfactants.[118] Redistilling a cut can increase the concentration of the desired fluorosurfactants to 99% or more by weight.[119] However, it is not economically feasible to make a distillation cut that consists of just *one* surfactant or surfactants (100%), that is every single molecule, that all have the same number of fluorinated carbon atoms

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[112] Walton Decl., Ex. 23, at ¶¶ 18-28; *see also* Dep. Tr. of Chemicals Inc. Fed. R. Civ. 30(b)(6) witness Ashok Moza, dated Nov. 2, 2021, attached to London Decl. as Ex. 77, at 93:25-95:15.
[113] Walton Decl., Ex. 23, at. ¶¶ 18-28.
[114] *Id*.
[115] *Id*.
[116] *Id*. at ¶ 27.
[117] *Id*.
[118] *Id*.
[119] Dep. Tr. of AGCCA production, marketing, and sale of components witness William J. Fiedler, dated October 19, 2021, attached to London Decl. as Ex. 78, at 63:3-20, 69:4-17, 82:8-19 ([redacted]

in their chains.[120] Even today, the fluorotelomer surfactants with chains of six (6) fluorinated carbon atoms (C6 fluorosurfactants) manufactured for use in AFFF concentrates contain trace (.00008%) amounts of unintended surfactants with eight (8) or more fluorinated carbon atoms. This level of C8 or higher homologues has no effect on the physical or performance properties of the concentrate or the foam.[121]

Contrary to Defendants argument, they did not have to choose to either save lives with AFFF or contaminate the nation's drinking water supply with PFOA and PFOS. The Defendants' MilSpec AFFF could have saved lives without contaminating the nation's drinking water supply with PFOA and PFOS by using shorter-chain fluorosurfactants in its AFFF. At a minimum, the record evidence demonstrates a hotly disputed question of fact as to whether Defendants were required to use PFOA and/or PFOS.

4. The MilSpec Never Explicitly Required that AFFF contain PFOA or PFOS.

Although a performance specification could theoretically contain a specific formula, such is not the case with MIL-F-24385, which did not include either the words PFOA or PFOS until 2017, and then only as a quantification limit, not a formulation requirement.[122] The U.S. admitted that the AFFF MilSpec has never required that AFFF contain PFOA or PFOS.[123] Mr. Farley specifically declared:

> From the first 1963 MilSpec until 2019, the AFFF MilSpec was for a film-forming agent that required the use of a fluorosurfactant. The MilSpec has never specified which fluorosurfactants were to be used; nor has the Navy ever specified any other components of AFFF – such as particular hydrocarbon surfactants or solvents – that were to be used. In fact, neither NRL nor the Navy are told which fluorosurfactants are included in the AFFF products. . . .[124]

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[120] Walton Decl., Ex. 23, at ¶ 28.
[121] *Id*. at ¶ 36.
[122] Darwin Dep. Ex. DL436, Ex. 42, at NAV01-000000905.
[123] US Resp. to Pls.' RFAs, Ex. 3, at p. 3, Resp. to RFA No. 5.
[124] Farley Dep. Ex. DL1385, Ex. 38, at ¶ 16 (emphasis added).

Defendants' own witnesses concur. For example, National Foam's Senior Chemist admitted that PFOA use was never required by the MilSpec:

Q. REDACTED

REDACTED

[125]

Contrary to Defendants' claims that they were railroaded into using PFOA and PFOS by the open term "fluorocarbon surfactant," the record contradicts this assertion. This disagreement confirms that genuine issues of material fact exist over whether the AFFF MilSpec did or did not require PFOA or PFOS and whether manufacturers were required to use them to pass Mil-Spec or not. Defendants chose PFOA and PFOS for their AFFF; not the Navy.

5. Defendants' Fluorosurfactants Were Trade Secrets.

The Defendants' systematic withholding from the government of the chemical composition of their product undermines their posturing that the MilSpec restricted their compliance under the contract. Although Defendants argue that the AFFF MilSpec was reasonably precise requiring PFOS, PFOA and/or its precursors, the Defendants never disclosed to the Navy or DoD the precise ingredients in their AFFF – let alone the specific fluorosurfactant(s) because that information was kept by Defendants as proprietary trade secret(s).

Defendants submitted no evidence supporting their argument that when the MilSpec says "fluorocarbon surfactant," the Navy really meant PFOA or PFOS, and not the thousands of other

[125] Regina Dep. Tr. Vol. II, Ex. 4, at 502:20-503:6 (emphasis added); *see also* Dep. Tr. of witness Philip J. Novac who has worked for both Tyco and National Foam, dated Mar. 18, 2021, attached to London Decl. as Ex. 79, at 229:18-230:1.

potential fluorosurfactants commercially available.[126] The U.S., however, has submitted sworn statements denying the substance of Defendants' contentions.

Again, Mr. Farley declared that Defendants kept secret the identity of their surfactants:

> **In fact, neither NRL nor the Navy are told which fluorosurfactants are included in the AFFF products. That information is a protected trade secret protected by each manufacturer**. The Safety Data Sheets for AFFF, which, as a user of AFFF, I use to understand the risks associated with the product, do not say which fluorosurfactants are included in the products. A set of example Safety Data Sheets from Buckeye from 2001 and 2017 is attached . . ., although all the Safety Data Sheets are similar.[127]

Query: if the AFFF formulas are proprietary and the government does not know the chemical constituents, how can the government knowingly mandate them? Defendants cannot argue they were constrained by the MilSpec to use only PFOA or PFOS, when they had complete discretion to create their own "witches brew" to meet the performance specification whose ultimate composition was never required to be disclosed.

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[126] OECD (2018). Toward a new comprehensive global database of per-polyfluoroalkyl substances (PFASs): Summary report on updated the OECD 2007 list of per and poly fluoroalkyl substances (PFASs). Series on Risk Management No. 39, OECD, available at: https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV-JM-MONO(2018)7&doclanguage=en (*last accessed* December 9, 2021), attached to London Decl. as Ex. 80.

[127] Farley Dep. Ex. DL1385, Ex. 38, at ¶ 16, referencing Farley Dep. Ex. DL1385-6, attached to London Decl. as Ex. 81. *See also*, Butenhoff Dep. Ex. DL38 at PENNA-NAVY-020453, and Santoro Dep. Ex. DL39 at 3M BELL00474506, 3M_BELL00474520, 3M_BELL00474530, 3M BELL00474537, 3M_BELL00474543, 3M_BELL00474549, 3M_BELL00474555, 3M_BELL00474567, 3M_BELL00474573, 3M_BELL00474579, 3M_BELL00474586, and 3M_BELL00474593 (3M Material Safety Data Sheets ("MSDSs")), attached to London Decl. as Exs. 82 and 83, respectively; Novac Dep. Exs. DL1159 at AFFFTC00045290, DL1160, DL1162, DL1163, and DL1164, and Ublacker Dep. Exs. DL1099 and DL1103 (Tyco MSDS's), attached to London Decl. as Exs. 84, 85, 86, 87, 88, 89, and 90, respectively; Vegso Dep. Ex. DL1748 at BF_00002499, BF_00010323 at BF_00010323, and BF_00000606 at BF_00000606 (Buckeye MSDS's), attached to London Decl. as Exs. 91, 92, and 93, respectively; NF000000005 at NF000000005, and NF000000013 at NF000000013 (National Foam MSDS's), attached to London Decl. as Exs. 94 and 95, respectively.

Plaintiffs have refuted all of Defendants' evidence and shown instead that the government did not include reasonably precise specifications in MIL-F-24385 regarding the selection of which fluorosurfactant to include in MilSpec AFFF. The MilSpec did not force AFFF manufacturers to use PFOA and/or PFOS, either explicitly or implicitly. At a minimum, the litany of contrary testimony from federal officers and the availability of alternatives that complied with the specifications demonstrates the continued existence of a series of unresolved questions of material fact, which, in turn, defeat Defendants' instant motion for partial summary judgment.

B. Issues Of Fact Predominate Regarding Whether DoD Continued to Purchase and Use MilSpec AFFF-Containing PFOS, PFOA, and/or Their Precursors with Adequate Knowledge of the Dangers Associated with Same.

Defendants likewise contend that they satisfied *Boyle* prong 1 under the "continued use" doctrine, as originally set forth in *Dowd*, because, they allege, the DoD continued to purchase and use MilSpec AFFF-containing PFOS, PFOA and/or their precursors despite some knowledge of the dangers associated with these chemicals.[128] The Court should summarily reject this time-sensitive argument. The basis for a swift rejection of Defendants' argument is simple and specific, at no point prior to May 2016 (***at the earliest***), when the EPA issued the LHA of 70 ppt (parts per trillion), can it possibly be argued that the government had actual knowledge of the dangers posed to humans by PFOS, PFOA, and/or its precursors. [129] Any DoD action taken before that time is not "continued use" as required for the government contractor defense.

As set forth below, historically, government knowledge relating to the dangers associated with PFOS, PFOA and/or their precursors, and, more specifically, these chemicals' use as AFFF constituents, can generally be split into two periods of time, namely, pre- and post-2000. Prior to

[128] Defs' Mem. at 2-3, 43-50.
[129] *See infra*, Section IV.B.5 (regarding CERCLA).

2000, the record illustrates an utter lack of knowledge on the part of the government that PFOS, PFOA and/or their precursors were even ingredients in AFFF. Further, during this pre-2000 timeframe, 3M was consistently touting the safety of AFFF, a claim Defendants steadfastly hold to this day.[130]

Post-2000, when DoD became aware of the presence of PFOS in 3M's Lightwater® brand AFFF, and, thereafter, when the government became aware of the potential presence of PFOA (and/or its precursors) in the telomer-based AFFFs, through to May 2016, the government's knowledge regarding hazards associated with these chemicals was never substantially complete. Partly to blame for this lacuna was that between the period of 2000-2016 the government's knowledge was consistently retarded by Defendants' significant misrepresentations about the safety of PFOA, PFOS and AFFF, upon which it reasonably relied. Finally, as discussed above, Defendants' claim that the government was thoroughly studying AFFF, PFOS and/or PFOA from the 1970s forward, and thus was fully informed as to their toxicological profiles, is both inaccurate and unsupported by any proper expert opinion evidence.

In short, it was not until May 2016, at the earliest, that the record supports any potential finding that the government had knowledge regarding the dangers of PFOS, PFOA and/or their precursors, was aware of their presence in MilSpec AFFF, and likewise possessed sufficient authority to phaseout AFFFs containing these chemicals. In 2016, [131] after receiving EPA guidance, DoD began the phaseout of the long-chain MilSpec AFFF, including the elimination of

[130] *See e.g.*, 3M website, available at https://www.3m.com/3M/en_US/pfas-stewardship-us/health-science/ (stating "[t]he weight of scientific evidence from decades of research does not show that PFOS or PFOA causes harm in people at current or past levels.") (*last accessed* Dec. 7, 2021).
[131] *See generally*, Birnbaum Decl., Ex. 6.

existing stockpiles.[132] As such, once DoD had appropriate and necessary information related to long-chain MilSpec AFFF, and EPA directive, contrary to Defendants' arguments, it did ***not*** continue to use PFOS, PFOA and/or their precursors in MilSpec-AFFF.[133] Rather, once the EPA provided appropriate and necessary directive, DoD not only stopped purchasing these products but also made plans to phase them out entirely.

1. DoD Was Unaware that PFOS, PFOA and/or Their Precursors Were Even in AFFF Before 2000.

Prior to 2000, as set forth above, the record before the Court establishes that the DoD was unaware of which fluorosurfactants were used in MilSpec AFFF as the fluorosurfactants were maintained as trade secrets. Throughout MDL discovery, multiple government witnesses testified that, prior to 2000, they had never even heard of PFOS and/or PFOA. For example, Mr. Darwin testified that REDACTED [134] Mr. Farley

[132] Ex. 131 to Defs' Mot. [ECF No. 1971-31], at FF_DOD0004_00002990, stating:

> On May 19, 2016, the EPA issued a [Safe Drinking Water Act] lifetime health advisory (LHA) recommending that the individual or combined levels of PFOS and PFOA concentrations in drinking water be below 70pppt. While the LHA is only guidance under the SDWA and not a required or enforceable drinking water standard, ***DoD began taking actions*** to address impacted drinking water…A part of DoD's multifaceted approach to address PFOS and PFOS, the ***Department is also taking steps to remove and replace AFFF containing PFOS from its inventory and supply system***…the Department is [also] initiating research and development projects related to developing a fluorine free foam, ***and developing technologies to quantify and clean up PFOS and PFOA***. (emphasis added)

[133] *See* AF02-000001138 (Dept. of Air Force Memo directing replacement of C8 legacy AFFF and replacement with C6 AFFF, August 22, 2016), attached to London Decl. as Ex. 96; PENNA-NAVY-017115 (Dept. of Navy Memo directing removal and disposal of C8 legacy AFFF, June 17, 2016), attached to London Decl. as Ex. 97.

[134] Darwin Dep. Tr. Vol. I, Ex. 2, at 109:6-21 (REDACTED

similarly testified REDACTED [135] If the former custodian of MIL-F-24385 and the lead qualifier for qualification on the QPL had never even heard of PFOA and/or PFOS prior to 2000, the Defendants' contention that prior to that time, the government had sufficient information regarding PFOA, PFOS and/or their precursors such that continued use of these chemicals was tantamount to their approval is dubious at best. At a minimum, the fact that neither Mr. Darwin nor Mr. Farley were even familiar with the terms PFOA and/or PFOS prior to 2000, creates a triable issue of fact as to whether prior to 2000, there is even a colorable argument that DoD continued to use MilSpec AFFF containing PFOS, PFOA and/or their precursors *with knowledge* of the dangerous propensities of same.

Moreover, not only has government witness testimony in this case illustrated a fundamental lack of knowledge even as to the components of AFFF, but when this lack of knowledge is juxtaposed against the breadth of information known to Defendants over time, but not shared with the government, the government's lack of knowledge regarding hazards associated with PFOS, PFOA and/or their precursors becomes even more apparent. Such behavior on Defendants' part is more supportive of punitive damages than summary judgment.

Perhaps one of the most glaring examples is 3M delaying over 20 years to notify the EPA that their proprietary chemical, PFOS, had contaminated the globe, and was in the blood of the general population.[136] However, despite holding this knowledge since 1975, 3M lawyers urged its

[135] Farley Dep. Tr. Vol. I, Ex. 35, at 89:15-24 (c REDACTED *see also Id.* at 67:7-13 (" REDACTED "), 70:17-24 REDACTED 129:22-24 (REDACTED

[136] *See* Butenhoff Dep. Tr. Vol. I, Ex. 21, at 300:1-10 (testifying that as of 1975, 3M had reason to suspect that PFOS was in the blood of the general population).

scientists "not to release the true identity (PFOS)"[137] of the compound being found in the blood of the general population. It was not until May 15, 1998, that 3M finally notified the EPA of this fact.[138] 3M concedes that it did not tell the government that PFOS was in the blood of the general population until 1998, nearly twenty years after it was known to 3M. Surely this knowledge gap creates an issue of fact regarding the extent of the government's knowledge pertaining to PFOS and its potential to cause human harm, which is relevant and critical to any assessment of the government's decision to continue to use long-chain MilSpec AFFFs.

2. Throughout the 1980s and 1990s 3M Touted the Safety of AFFF.

3M misrepresented and/or downplayed the environmental and human health risks associated with AFFF, as well as withholding PFOS exposure data. For example, 3M informed the government that "data available from standard toxicity tests" indicate that AFFF was "relatively innocuous."[139] In 1974, 3M told NRL that its AFFF was biodegradable and presented no adverse effects on the environment.[140] 3M even went so far as to advertise its AFFF as "biodegradable, low in toxicity, and it can be treated in biological treatment systems."[141]

Eric Reiner, Ph.D., 3M's former Environmental Specialist, repeatedly downplayed concerns about the use of AFFF through the 1980s. In 1983, in response to concerns about potential groundwater contamination from AFFF use at Mather Air Force Base, Dr. Reiner claimed that 3M's AFFF "is practically nontoxic," and stated that "we do not expect that hazardous levels of

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[137] *See* Gerber Dep. Ex. LP68, Ex. 20. The reference to CAL in this exhibit is 3M's Central Analytical Lab ("CAL").
[138] *See* Gerber Dep. Ex. DL353, Ex. 50, at 3M_BELL02796621.
[139] Darwin Dep. Ex. DL53, relevant pages attached to London Decl. as Ex. 98, at Navy02-00007167.
[140] Navy02-00007013, attached to London Decl. as Ex. 99, at Navy02-00007025.
[141] 3M_BELL03194246, attached to London Decl. as Ex. 100, at 3M_BELL03194250; *see also* 3M_BELL02617421, attached to London Decl. as Ex. 101, at 3M_BELL02617425.

groundwater contamination are likely to result from your usage of the 3M product."[142] Also, in 1983, Dr. Reiner provided similar information to George Hess at the EPA, calling 3M's AFFF "considerably less toxic than jet fuel."[143]

3M's declarations of safety continued through the 1990s. The company's 1993 Product Toxicity Summary Sheet for FC-203CF Light Water Brand AFFF claims that following animal studies, the company concluded that FC-203CF is considered practically non-toxic orally and dermally and only "moderately irritating" to the eyes under the conditions of this study.[144] REDACTED [145] These misrepresentations by 3M had the ultimate net effect of delaying the government's ability to fully understand the hazards associated with PFOS, including its propensity to contaminate drinking water and thus the great potential for human exposure. This further renders the question of the government's knowledge of dangers associated with these chemicals even more complex and impossible to determine as a matter of law.

Although Defendants point to random studies conducted by various government agencies, Plaintiffs' expert, Dr. Birnbaum, none of these[146] would have provided the government with sufficient information of human health risk. The studies are insufficient because they are not, *inter alia*: (1) of the type, quality, or scope considered to be the gold standard for toxicology; (2) none of the studies were designed to investigate the no-observable effect level or cancer slope to

[142] Walker Dep. Ex. BB816, attached to London Decl. as Ex. 102, at 3M_BELL01440788.
[143] 3M_BELL01440784, attached to London Decl. as Ex. 103.
[144] US-Darwin-00005906, attached to London Decl. as Ex. 104, at US-Darwin-00005907.
[145] Santoro Dep. Ex. DL65 (documenting Apr. 12, 1994 call), attached to London Decl. as Ex. 105, at 3M_AFFF _MDL00384561.
[146] Defs' Mem. at 22.

determine potential harm to humans from PFOA and PFOS exposure; (3) few of the cited studies were published in the peer-reviewed literature; (4) none of these studies evaluated PFOA; (5) only a narrow range of effects were examined; and (6) the studies did not consider exposure assessment or quantify the levels of exposure that might lead to human health risk.[147] These are just some of the deficient aspects of the studies that Defendants, without expert analysis, inaccurately rely upon to argue that the government knew of the dangers associated with the MilSpec AFFF containing-PFOS, PFOA and/or their precursors.

In sum, Plaintiffs' evidence substantiates that prior to 2000, relevant government witnesses had never even heard of PFOS, PFOA and/or their precursors; prior to 1998, the government was unaware that the general population had been exposed to PFOS, including virtually every American having it in their blood; the government had not done an independent assessment of the toxicity of PFOS, PFOA and/or AFFF beginning in the 1970s; and finally, throughout their use of AFFF, the government was repeatedly being told by the Defendants that PFOS, PFOA and AFFF were safe. Taking the totality of this record together, it is clear that there are countless issues of fact for a jury to decide regarding the extent of the government's knowledge of the hazards associated with PFOS, PFOA and/or their precursors, their use in AFFF, and the extent to which the government knew of toxicity associated with these AFFFs.

3. From 2000 to 2016, the Government's Knowledge of Dangers Associated with PFOA and PFOS Was Never Adequate.

At the time it phased out C8 chemistries, 3M specifically represented that despite its phaseout, "[a]ll existing scientific knowledge indicates that the presence of these materials at these very low levels does not pose a human health or environmental risk."[148] As such, although the

[147] *See* Birnbaum Decl., Ex. 6, at ¶32.
[148] Reich Dep. Ex. DL49, Ex. 47.

government learned of the presence of PFOS in 3M's AFFF just prior to 2000, it was simultaneously being assured by 3M that products containing such C8 chemistries were safe with respect to human health and the environment, which would include 3M's LightWater® AFFF. Even in 2000, when EPA proposed a Significant New Use Rule ("SNUR"),[149] which prevented companies from either manufacturing or importing PFOS in the United States (with limited exceptions) because it lacked actual knowledge of the dangers to human health posed by PFAS EPA explicitly advised DoD they could continue to use existing stocks of AFFF containing PFOS. In fact, in a presentation at the Pentagon on March 16, 2001, EPA told DoD that the SNUR "(w)ould not affect *continued use* of stocks of chemicals obtained before the end of the phaseout."[150] (Emphasis added). This evidences the government's lack of understanding of the dangers posed by PFOS, including on the part of EPA, upon whom the DoD must rely to inform its decisions with respect to the use of potentially toxic chemicals.

Post-2000, when new telomer-based AFFFs became available for purchase by DoD, largely as a result of 3M's phaseout, the government was led to believe telomer based AFFFs were PFOA and PFOS free. Mr. Walker testified [redacted][151]

[149] A SNUR is a rule that EPA issues in order to get advance notice about the new use of a chemical that could have potential to harm human health or the environment.

[150] Dep. Tr. of Air Force witness Curtis Bowling, dated October 7, 2021, attached to London Decl. as Ex. 106, at 217:10-218:7 ([redacted] *see also*, Bowling Dep. Ex. DCC705, attached to London Decl. as Ex. 107, at EPA01-00161542 and EPA01-00161543 (2001 presentation of Mary Dominiak of EPA to DoD stating that "[c]urrent EPA activities would not restrict *continued use* of PFOS-based AFFF stocks" (emphasis added)).

[151] Walker Dep. Tr. Vol. I, Ex. 70, at 173:19-175:24 ([redacted]

Preying on the government's naivete and taking advantage of the AFFF market void left by 3M's phaseout, the telomer-AFFF manufacturers, like 3M before them, inaccurately, and routinely, boasted that their AFFFs were safe and PFOA-free. This disinformation was often transmitted through the industry-funded group the Fire Fighting Foam Coalition ("FFFC").[152] Through the FFFC, the AFFF-telomer manufacturers told the government that "[f]luorotelomer-based foams are not made with PFOA (perfluorooctanoic acid) or any PFOS-based products…."[153, 154] Examples of such misrepresentations in this regard include the following:

- REDACTED [155]
- [redacted] [156]
- In June 2019, responding to a customer's concerns regarding C8 in its AFFF stock, Defendant Buckeye stated that their foam "has never contained any PFOS/A" and that "PFOS/A (PFAS)…has nothing to do with C-6 or C-8."[157]

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[152] On its website, the FFFC describes itself as a "coalition of industry leaders formed to represent manufacturers, distributors and users on issues related to the efficacy and environmental impact of fire-fighting foam." *See* https://www.fffc.org/ (*last accessed* Aug. 9, 2021).

[153] Korzeniowski Dep. Ex. DL93, Ex. 68, at Navy02-00002442; *see also* Regina Dep. Ex. DL517, Ex. 69, at AFFF-MDL-CHE-00000911 (2001 FFFC presentation to the Environmental Protection Agency ("EPA") stating that telomer-based AFFF does not contain any PFOA-based products.)

[154] The FFFC's membership includes, *inter alia*, Ansul, Chemguard, Dynax, National Foam, Fire Service Plus and Solberg, all Defendants in the *AFFF MDL*.

[155] Regina Dep. Ex. DL480, attached to London Decl. as Ex. 108; *see also* Dep. Tr. of Anne Regina, dated Dec. 1, 2020, attached to London Decl. as Ex. 109, at 294:3-13 (REDACTED [redacted]

[156] Novac Dep. Ex. DL1126, attached to London Decl. as Ex.110, at AFFFTC00196371; *see also* Novac Dep. Ex. DL1134, attached to London Decl, as Ex. 111, at AFFFTC00418728 REDACTED [redacted]

[157] Vegso Dep. Ex. DL1753, attached to London Decl. as Ex. 112, at BF_00390042-43 (also stating that C8-based foams are not harmful and "very unlikely" to be "regulated out," and admitting that Buckeye foams contained C8 until at least October 2018); *see also* Dep. Tr. of Buckeye witness

More specifically, the government was led to believe that telomer-based foams were primarily based on C6 chemistry rather than C8,[158] REDACTED [159] This is corroborated by the testimony of United States witness Dr. Ronald Sheinson, who between 1970 and 2010, served as a Research Chemist at the NRL. Dr. Sheinson testified h REDACTED On the contrary, however, the evidence to date belies this premise as multiple telomer-based fluorosurfactants manufacturers in fact were selling fluorosurfactants for use in telomer-based AFFF that were centered around C8-chemistry (not C6), and thus capable of degrading to PFOA.[161]

Although PFOA may not be intentionally added to telomer-based AFFFs (in most cases), these AFFFs nonetheless contain fluorosurfactants that include eight-carbon molecules (C8s or PFOA precursors) that degrade to PFOA. Because these precursors degrade to PFOA in the environment, these C8s or PFOA precursors are included within the scope of the EPA's 2010/2015

Jim Devonshire, dated Oct. 27, 2021, attached to London Decl. as Ex. 113, at 144:7-11 (REDACTED .

[158] *See* Dep. Tr. of NRL witness Ronald Sheinson, Ph.D., dated June 28, 2021 ("Sheinson Dep. Tr."), attached to London Decl. as Ex. 114, at 137:10-138:18 (REDACTED *see also*, Regina Dep. Ex. DL464, attached to London Decl. as Ex. 115, at NF000165533 (stating that the FFFC led the EPA to wrongly believe that AFFF was made only with C6 surfactants).

[159] *See, e.g.*, Novac Dep. Ex. DL1126, Ex. 110, at AFFFTC00196372 (*see also* Novac Dep. Ex. DL1125, attached to London Decl. as Ex. 116, at AFFFTC00728487 (stating that "REDACTED Novac Dep. Ex. DL1135, attached to London Decl. as Ex. 117, at AFFFTC00043585 REDACTED

[160] *See* Sheinson Dep. Tr., Ex. 114, at 137:10-138:18.

[161] *See, e.g.*, Dep. Tr. of Dynax Fed. R. Civ. 30(b)(6) witness Eduard Kleiner, Ph.D., dated Nov. 10, 2020, attached to London Decl. as Ex. 118, at 316:14-22 REDACTED

PFOA Stewardship Program, which required essentially complete reduction of PFOA by the end of 2015.[162] This important fact -- that the C8s in fluorosurfactants utilized in telomer-based AFFF can degrade to PFOA in the environment – is never mentioned in any of the FFFC statements. Instead, it repeatedly stated that telomer-based foams are PFOA-free, a patently misleading statement. This drumbeat of misleading statements further delayed the government's ability to understand the totality of the dangerous associated with AFFFs containing PFOA and/or its precursors. In short, although the Stewardship Program was put into place in 2006, due to misrepresentations on the part of the AFFF-telomer manufacturers, the government was delayed in its understanding of the role PFOA played in regard to AFFF.

4. DoD Did Not Act Until 2016 Due to Industry's Lack of Transparency and Because PFAS Toxicity Knowledge Was Evolving.

3M's failure to disclose that it knew that PFOS was in the blood of the general population as early as 1975, led to a three-decade long delay in the commencement of the regulatory process of examining PFAS toxicity. Similarly, 3M's withholding of hundreds of other PFAS studies until 2000, further delayed PFAS investigation by safety regulators. When 3M withdrew from the AFFF market in 2002, the DoD was also still being assured by the AFFF-telomer manufacturers that their AFFF was safe and posed no risk of harm, a position they hold to this day. Despite these industry reassurances, the EPA, to its credit, as part of a precautionary approach, began in 2006 to conduct its own investigation on PFAS toxicology, including through the PFOA Stewardship Program. Similarly, in 2015, the Air Force, again, out of an abundance of caution, ceased the use of AFFF in training exercises.[163] Despite these efforts to understand PFAS and to treat them with a

[162] Buck Dep. Ex. DL371, Ex. 67, at pp. 3 & 11 (noting that the scope of the program includes PFOA precursor chemicals, which includes chemicals manufactured through the telomer manufacturing process).
[163] *See* AF04-00768856, attached to London Decl. as Ex. 119, at AF04-00768857.

precautionary approach, even as late as 2009, when it issued its provisional LHA, EPA maintained that the science regarding PFAS and human health risk was still "inconclusive."[164] Other authoritative agencies and groups said the same.[165]

Further, between 2000-2016, PFAS toxicity knowledge was evolving. During this time, this evolution included milestone events that increased the scientific community's knowledge of PFAS toxicity. For example, between 2011-2012, the results of the first ever large-scale (approximately 80,000 people) epidemiological study of the general population were published, which showed statistically significant associations between PFOA and cancer, among other diseases.[166] In 2016, the International Agency for Research on Cancer ("IARC"), found that PFOA was a "possible human carcinogen."[167] It was in this context, that EPA made its *final* determination regarding safety limits of PFAS in drinking water, and finally quantified a lifetime exposure limit for these chemicals. However, again, when EPA did make such determination, DoD, relying on EPA's guidance, acted *promptly* to implement a protocol for the discontinuance of legacy C8-based AFFF, and a program to replace and remove existing stockpiles at significant expense.[168]

5. DoD Defers to EPA for Public Health Decisions.

All departments and agencies of the federal government --- including the DoD --- defer to the EPA to develop and announce federal policy as it relates to use of hazardous substances. DoD

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[164] EPA, Provisional Health Advisories for Perfluorooctanoic Acid (PFOA) and Pefluorooctane Sulfonate (PFOS), dated Jan. 8, 2009, available at https://www.epa.gov/sites/default/files/2015-09/documents/pfoa-pfos-provisional.pdf (*last accessed* Dec. 17, 2021), attached to London Decl. as Ex. 120, at p. 1.

[165] *See* Birnbaum Decl., Ex. 6, at ¶ 20; Butenhoff Dep. Ex. DL74B, attached to London Decl. as Ex. 121, at p. 5 ("Although a large number of epidemiology studies have examined the potential of perfluoroalkyl compounds to induce adverse health effects, most of the studies are cross-sectional in design and do not establish causality.").

[166] *See* C8 Science Panel website, available at http://www.c8sciencepanel.org/prob_link.html (*last accessed* Dec. 22, 2021).

[167] Regina Dep. Ex. DL455, attached to London Decl. as Ex. 122, at p. 3.

[168] *See* note 132, *supra*.

does not make determinations of a particular substance's toxicity; it relies on EPA to assess chemicals' toxicity to humans. At the highest level, the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA" or "Superfund") expressly forbids any federal department, agency, or instrumentality to adopt any rule, guideline, regulation, or criteria that is inconsistent with those established by the EPA.[169] The DoD reiterates this as its guiding principle, requiring compliance with CERCLA.[170]

As Dr. Birnbaum points out succinctly, "[t]he DoD relies on the EPA and a formal deliberative process for hazard identification, and more specifically, the determination as to whether a compound present in a product in use poses a risk of harm to human health, and to guide management decisions regarding product use."[171] In regard to PFOA and PFOS, "[i]t was not until 2016 that the EPA provided a formal hazard assessment for PFOA or PFOS in drinking water, sufficient for the DoD to rely upon to make sound management decisions, specifically, as to whether to continue to use AFFF containing PFOA or PFOS."[172] Thus, prior to May 2016, DoD would not have been in a position to phaseout MilSpec AFFFs containing PFOA, PFOS and/or their precursors, which is consistent with testimony from government witnesses, including Mr. Farley, who specifically testified that the REDACTED s "REDACTED."[173]

[169] 42 U.S.C. §§ 9601(2), 9620 (a); *see also* Exs. to Defs' Mot. 109, 110, & 111 [ECF Nos. 1971-9, 1971-10, 1971-11, respectively].
[170] DoD Manual 4715.20, Enc. 2 (1)(a), Enc. 3 (1)(a), (b). DOD Manual § 4715.20 (March 9, 2012), available at https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodm/471520m.pdf (last accessed Nov. 29, 2021), attached to London Decl. as Ex. 123.
[171] Birnbaum Decl., Ex. 6, at ¶12.
[172] *Id*. at ¶ 19.
[173] Farley Dep. Tr. Vol. I, Ex. 35, at 332:5-333:5; *see also*, Walker Dep. Ex. DL1380, attached to London Decl. as Ex. 124 (notice from Air Force noting that it did not have reason to change its policies regarding foam until 2016 when the EPA issued a health advisory).

Notably in 2021, the DoD's Inspector General investigating the DoD's use of AFFF specifically stated that "[emerging contaminant]" program officials did not require proactive risk management actions to PFAS containing AFFF regarding human health risks *until 2016*, stating:

> EC program officials issued a risk alert in 2011 that describe the risks to DoD areas of concern including risks to human health and the environment. However, the 2011 risk alert was not a risk management action because it was not endorsed by the Emerging Chemicals of Concern Governance Council. Therefore DoD officials were *not* required to plan, program and budget for any actions in response to the 2011 risk alert. EC officials did *not* require proactive management actions for PFAS containing AFFF *until 2016*. [174] (emphasis added).

Once EPA provided direction to DoD in 2016, however, DoD began to phase out these AFFFs, which, again, evidences that when armed with the requisite information and authority, DoD initiated its program to replace existing stock and discontinue use of these harmful products.[175]

In light of the many controverted questions of fact on this record, it cannot be said, as a matter of law, that the government had actual knowledge of the dangers of PFOA, PFOS and/or their precursors, and nonetheless continued to use AFFFs containing these noxious chemicals, especially given the testimony of the United States witnesses that, *inter alia*: (1) prior to 2000, they had no idea what PFOA and PFOS were and/or that they were found in AFFF; (2) at or about the time of 3M's phaseout, the government believed telomer-based AFFFs to be a solution to the PFOS problem, because such AFFFs did not possess the same dangerous associated with 3M's AFFF; (3) the government was not always aware that telomer-based AFFFs contained PFOA; (4) the government was being told that telomer-based AFFFs were PFOA-free and safe; (5) finally,

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[174] *See* 2021 Inspector General Report titled "Evaluation of the Department of Defense's Actions to Control Contaminant Effects from Perfluoroalkyl and Polyfluoroalkyl Substances at Department of Defense Installations," attached to the London Decl. as Ex. 125, at i-ii.
[175] *See* note 132, *supra*.

DoD had not yet received directive from the EPA concerning the hazards of PFOA and PFOS and thus lacked sufficient authority to phaseout MilSpec AFFFs containing same.

Defendants rely heavily on *Dowd, supra* and *Ramey v. Martin-Baker Aircraft Co*., 874 F.2d 946 (4th Cir. 1989), to contend that DoD continued to purchase and use MilSpec AFFF-containing PFOS and PFOA despite full knowledge of the dangers associated with these chemicals. This purported knowledge, according to Defendants' interpretation of these cases, entitles them to the government contractor defense. Such reliance is misplaced as both cases are factually distinguishable.

Dowd turned on the Army's "extensive familiarity and field experience" with the defective product at issue there, namely, the 540 rotor system being used in certain helicopters for which the Army had conducted investigations, and found the system to be responsible for multiple helicopter crashes but yet continued to use that system.[176] In fact, there, the Army went so far as to reject proposals by the manufacturer to fix the defective rotors, which clearly demonstrated the government's approval of the design.[177]

In contrast, the government's familiarity and knowledge with the dangers posed by PFOS and PFOA was woefully lacking: (a) DoD did not actually know that either of these chemicals were in AFFF until 2000, at the very earliest; (b) DoD was unaware until 1998 of the presence of PFOS in the blood of the general population; (c) even when the government began to learn of the presence of these chemicals in AFFF it was led to believe that these chemicals were safe and that PFOA had been eliminated from AFFF well before that was true; and (d) as explained by Plaintiff's expert, none of the studies Defendants cited as allegedly providing notice of toxicity associated

[176] *Dowd,* 792 F.2d at 410-412.
[177] *Id*. at 411.

with PFOS and/or PFOA of the quality to necessary to impute the government with knowledge of potential harm to human health. As such, unlike in *Dowd*, the government did not approve of the continued use of the defective products at issue with actual knowledge of their dangers.

Defendants' reliance on *Ramey* is equally unavailing. In *Ramey*, the court held that the Navy's participation in the design of an aircraft seat constituted more than a "rubber-stamping" of the design, and, therefore, under the first prong of *Boyle*, the government contractor defense was a bar to plaintiff's claims.[178] There, the Navy had issued the original design specifications for the aircraft seat, inspected and tested the allegedly defective seat, and even examined a mock-up of the aircraft seat.[179] Conversely, here, as discussed above, when MIL-F-24385 was issued, it was issued as a performance specification, not a design specification, and, as such, the Navy never dictated a specific recipe for AFFF like it did for the aircraft seat in *Ramey* or the formulation for *Agent Orange*. Thus, *Ramey* does not support the application of the government contractor defense in this case.

Finally, Defendants' reliance on *Agent Orange* is also misdirected. There, one of the defendants considered it "impossible" to use a different herbicide other than the 2,4,5-T specified in the government contract for Agent Orange, "because the Army had studied only the normal esters" and insisted upon a testing if the product was to be altered. 517 F.3d at 91. No such evidence of government insistence on the use of PFOS or PFOA because of studies it conducted exists here. A further distinction exists as plaintiffs there alleged that a different manufacturing method would have resulted in nearly non-detectable amount of dioxin being produced during the manufacture of Agent Orange, and that would have likely eliminated the totality of the harm being alleged by

[178] *Ramey,* 874 F.2d at 950.
[179] *Id*.

plaintiff.[180] The *Agent Orange* court agreed with plaintiffs that their claim that a different manufacturing process would have resulted in less harm to plaintiffs, would, at a minimum, create an issue of fact with regard to whether the defendants could have complied with their contractual obligations under the relevant procurement contract while causing less danger to military personnel. *Id*. at 94. Such is likewise the case here. Defendants could have manufactured a safer alternative product either through using a shorter-chain C6-based fluorosurfactant in their AFFFs and/or by distilling out C8-compounds before incorporating fluorosurfactants into AFFF products, which still would have still allowed AFFF manufacturers to meet the performance requirements of MIL-F-24385. Here, Plaintiffs have supported these alternative manufacturing theories with competent expert analysis.

Because the *Agent Orange* court agreed with plaintiffs that a different manufacturing method may have resulted in lesser harm,[181] the court went on to ascertain whether the government had tacitly accepted the toxicity of dioxin by evaluating and examining such purported toxicity and continuing to use the product nonetheless. However, unlike in *Agent Orange*, here, the government was not evaluating and examining the toxicity of PFOS and/or PFOA. Rather, the studies conducted by the government, according to Plaintiff's expert, Dr. Birnbaum, were insufficient to put the government on notice of the risk of human harm resulting from the use of AFFF. Certainly, Dr. Birnbaum's opinion regarding the weight to be given to the toxicity studies cited by Defendants creates an issue of fact with respect to what knowledge (if any) one can gain about human health risk from Defendants' "toxicity" studies. In short, the factual record before

[180] *In re Agent Orange Prod. Liab. Litig*., 517 F.3d at 94.
[181] *Id.* at 94.

this Court is plainly different than that before the *Agent Orange* court, and, as such, it simply does not support Defendants' position that they are entitled to the government contractor defense.[182]

It simply cannot be said, as a matter of law, that DoD continued to purchase and use AFFF despite adequate knowledge of the dangers associated with same, and, as such, Defendants' Motion should be denied.

V. CONCLUSION

As detailed above, and summarized in the attached Statement of Material Facts in Dispute,[183] multiple genuine issues of material fact remain for the jury to decide, thus precluding summary judgment. Plaintiffs respectfully request that the Court deny Defendants' Motion for Partial Summary Judgment on the First Element of the Government Contractor Immunity Defense and grant such other relief as the Court deems just and proper.

Dated: December 22, 2021

/s/ Fred Thompson, III
Motley Rice LLC
28 Bridgeside Boulevard
Mt. Pleasant, SC 29464
Phone: (843) 216-9000
Fax: 843-216-9440
fthompson@motleyrice.com
Plaintiffs' Liaison Counsel

-and-

[182] Both *Lewis v. Babcock Indus., Inc*., 985 F.2d 83 (2d Cir. 1993) and *Brinson v. Raytheon Co.,* 571 F.3d 1348 (11th Cir. 2009) are equally inapposite. In *Lewis*, the court held that because the Air Force had exercised discretion in making changes to the knowingly defective cables at issue there, it had approved of the design specifications despite knowledge of the alleged defect. *Lewis,* 985 F.2d at 89. Similarly, in *Brinson*, the Eleventh Circuit held that the application of the government contractor defense to be proper where the Air Force ordered rudder trim system's that were alleged to be defective but which the Air Force had been significantly involved in selecting them. *Brinson*, 571 F.3d at 1354-56. These cases stand in stark contrast to the factual circumstances presented here where the government never had full knowledge of the dangers associated with PFOS, PFOA and/or AFFF before May 2016, at the earliest.

[183] *See* Appendix.

/s/ *Michael A. London*
Michael A London
Douglas and London PC
59 Maiden Lane, 6th Floor
New York, NY 10038
Phone: 212-566-7500
Fax: 212-566-7501
mlondon@douglasandlondon.com

Paul J. Napoli
Napoli Shkolnik PLLC
1301 Avenue of The Americas
10th Floor
New York, NY 10019
Phone: 212-397-1000
Fax: 646-843-7603
pnapoli@napolilaw.com

Scott Summy
Baron & Budd, P.C.
3102 Oak Lawn Avenue, Suite 1100
Dallas, TX 75219
Phone: 214-521-3605
Fax: 214-520-1181
ssummy@baronbudd.com

Co-lead Counsel for Plaintiffs

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing was electronically filed with this Court's CM/ECF on this 22nd day of December, 2021 and was thus served electronically upon counsel of record.

/s/ Fred Thompson, III

INDEX OF MATERIAL FACTS IN DISPUTE
PURSUANT TO LOCAL RULE 7.05(A)(4)

GENUINE ISSUES OF MATERIAL FACT	LOCATION IN RECORD
Does MIL-F-24385 impose a formulation requirement or a performance requirement?	Pltfs' Mem. at 24-25
Did any version of the military specification for AFFF (MIL-F-24385) ever require the use of a particular fluorinated surfactant?	Pltfs' Mem. at 25-27
Did any version of the military specification for AFFF (MIL-F-24385) ever require the use of C8 compounds-- specifically PFOA, PFOS, and/or their precursors?	Pltfs' Mem. at 30-33
Were the AFFF manufacturers constrained to use C8 fluorosurfactants to pass the performance specifications of MIL-F-24385?	Pltfs' Mem. at 28-30
Did NRL know the composition of the fluorinated surfactant 3M was using in the AFFF formulation FX183 developed for NRL in 1963?	Pltfs' Mem. at 6-9
Did NRL or NAVSEA know the composition of the fluorinated surfactant any manufacturer used in any AFFF formulation submitted for qualification under MIL-F-24385??	Pltfs' Mem. at 31-33
Could the AFFF manufacturers have used any of the thousands of fluorosurfactants to meet MIL-F-24385?	Pltfs' Mem. at 25-27
Could Defendants have met MIL-F-24385 by using a safer, shorter-chain fluorinated surfactant (*i.e.*, C6) and if so, when?	Pltfs' Mem. at 28-30
Was the DoD aware, at the time that it promulgated MIL-F-24385, of the risks to human and environmental health associated with the use of PFOA or PFOS in AFFF formulations?	Pltfs' Mem. at 33-37
Was the government thoroughly studying the risks to human and environmental health posed by AFFF, PFOS and/or PFOA from the 1970s forward?	Pltfs' Mem. at 37-43
Was the government aware, at the time that it promulgated MIL-F-24385, that 3M's AFFF was made with PFOS?	Pltfs' Mem. at 31-33; 35-37

Was the government aware, at the time that it promulgated MIL-F-24385, that the telomer manufacturers made AFFF with PFOA and precursors that break down into PFOA?	Pltfs' Mem. at 15-18; 31-33; 35-37
Did 3M know by 1980 that PFOS was bioaccumulative, that PFOS was found in blood of the general population, and that it was toxic to monkeys?	Pltfs' Mem. at 11-15; 33-37
Was the DoD aware of the widespread presence of PFOS or PFOA in the blood of the general population from the use of AFFF throughout the 1960s,70s, 80s and 90s?	Pltfs' Mem. at 33-40
Was the DoD aware of the widespread presence of PFOS and PFOA in the blood of the general population from the use of AFFF, and if so when?	Pltfs' Mem. at 11-15; 35-39
Was the DOD aware of the presence of PFOA or PFOS in drinking water from the use of AFFF in a quantified amount of PFOA or PFOS that posed a risk of harm to human health, and if so when?	Pltfs' Mem. at 43-50
Does 3M, the FFFC, and/or any of its members consistently maintain today that the amount of PFOA or PFOS (or their precursors) found in the environment and in drinking water throughout the United States poses absolutely no risk of harm to human health?	Pltfs' Mem. at 39-43
Did 3M's failure to disclose what it knew about the presence of PFOS in the blood of the general population in the 1970s delay for decades the regulatory process that culminated in EPA's 2016 issuance of a lifetime health advisory for PFOA and PFOS in drinking water?	Pltfs' Mem. at 43-46
Did 3M fail to disclose what they knew from decades of internal studies demonstrating harmful effects to laboratory animals exposed to PFOA and PFOS including, *inter alia*, Leydig cell tumors in rats in multiple studies, a "triad" of three different types of tumors in rats in one single study, and liver and kidney effects in multiple species including monkeys and others?	Pltfs' Mem. at 12-15; 36-37
Did 3M disclose to the EPA or military that in 1998 it considered PFOS to be "insidiously toxic"?	Pltfs' Mem. at 15
Did 3M represent throughout the 1970s, 80s and 90s that PFOS was biodegradable, practically non-toxic, of low risk to	Pltfs' Mem. at 37-39

the environment, and could be treated with biological treatment processes?	
Did 3M disclose to the government before the year 2000 what the company had learned about PFOS being bioaccumulative, found in the blood of the general population, and was toxic to monkeys?	Pltfs' Mem. at 12-15; 35-37
Was the government aware, after 3M's phaseout of PFOS, that telomer-based AFFF was made with PFOA and PFOA precursors that break down into PFOA?	Pltfs' Mem. at 15-18; 39-43
Did the government know that 3M's PFOS was found in the blood of the general population before 3M's disclosure in 1998?	Pltfs' Mem. at 12-15; 35-37
Did the government rely on 3M's representations that 3M's AFFF was non-toxic, biodegradable, and presented no adverse effects to human health?	Pltfs' Mem. at 37-40
Did DoD reasonably rely on EPA's formal risk assessment for decisions regarding AFFF?	Pltfs' Mem. at 44-47
Did DoD discontinue use of AFFFs containing PFOA and/or PFOS when EPA issued its formal hazard assessment in May 2016?	Pltfs' Mem. at 44-47
Does the 800 parts per billion (ppb) limitation on PFOA and PFOS in the current version of MIL-F-24385 indicate that the government has always known that PFOA and PFOS are in AFFF or is somehow endorsing its use?	Pltfs' Mem. at 10; 28-30; 31-33
Did EPA know in 2009, when it issued its PHAL announcing that the evidence was "inconclusive," that PFOA presented risks to human health?	Pltfs' Mem. at 43-44